Quick Close-Out and Service . . 78

Transmission Booms 81

Convair Plant Converted 102

Photos Save Money 105

ELECTRICAL WEST

December 1957

25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Decorations for the Robert H. Galbreath home express Christmas greetings to the West. They won Denver's 1956 lighting contest

Economic Voltage Control 84

Central Control 86

Sixth PCEA Hawaiian Conference 91

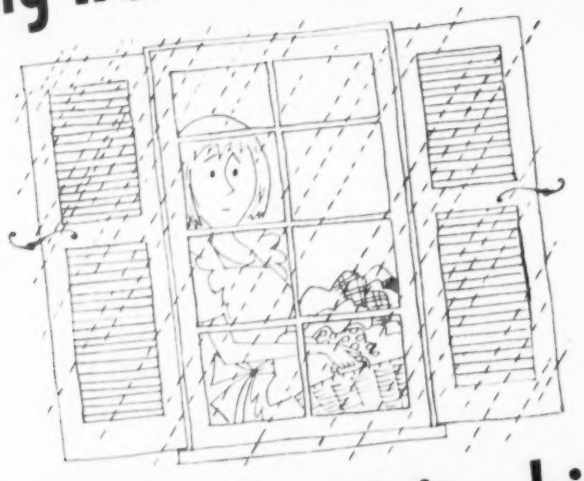
SW Inspectors Like Their Workshops 94

Tipsters Boost Sales 112

Ticket to the Future 75

Edison
is selling the
advantages
of electric drying–
to boost your
electric dryer
sales

Why wait on the weather



–when electricity dries

fresh-air sweet indoors?

Only Electric Dryers can do it. In an electric dryer, radiant coils warm the air inside. There's no flame, none of the by-products of combustion. It's cleaner and purer than any other way of drying. And 32% fluffier than back-yard drying. Best of all – electric drying doesn't fade colors.

Electric dryers not only cost less to buy, but less to maintain. Before you wait on the weather again, see the new electric dryers at your appliance dealer.

LIVE BETTER—ELECTRICALLY · SOUTHERN CALIFORNIA Edison COMPANY

SMOOT-HOLMAN

TWIN-LUX

Luminaires

Light — tailored to fit the need

Color — controlled to fit the mood

acrylic or vinyl diffusing panels

40" x 40" plastic louvers

Entirely self-contained Smoot-Holman Twin-Lux Luminaires provide soft, diffused, localized light. The relatively large area of this shallow, two-by-four fixture controls brightness and assures uniformity of illumination. Color filters can be inserted in the louvered style to create the desired atmosphere.

- *Designed for individual installation or end-to-end mounting*
- *Require no structural or architectural changes*
- *Economical to install and maintain*

Certified Lighting

SMOOT-HOLMAN
COMPANY
INGLEWOOD, CALIFORNIA

Send for illustrated, descriptive brochure.

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas," & "Journal of Electricity." Contents copyright. Seventy-first year of publication.

George C. Tenney, Publisher
C. W. Leihy, Editor
W. A. Cyr, Consulting Editor
Peggy Boyer, Associate Editor
Jack Robinson, Engineering Editor
Dale VanHorn, News Editor
Miriam Stuart, Editorial Assistant

Regional Editors
Frank Pitman, Intermountain
Marvin Petal, Pacific Southwest
Berkeley Snow, Pacific Northwest

CONTENTS

VOL. 119, NO. 7 DECEMBER 1957

$1 Billion Ticket to the Future by Gwilym A. Price 75
Quick Close-Out and Service 78

ENGINEERING

Transmission Construction Booms 81
Economic Voltage Control by M. P. Goudy 84
Central Control by Jess R. Herrera 85

ASSOCIATIONS

Sixth PCEA Hawaiian Conference 91
SW Inspectors Like Their Workshops 94
PCEA-PCGA Joint Conference Takes a New Look—Now 97

LIGHTING AND WIRING

Convair Plant Converted by W. E. Brautigam and L. G. Lamp 102
It Pays to Use Camera as a Tool by John A. Bailey 105

MARKET DEVELOPMENT

Tipsters Boost Sales 112
A Bigger Parade at Hawaii 111

DEPARTMENTS

Bulletins	33	News	137
Contractors' News Letter	107	News Roundup	10
Editorials	72, 133	Profiles	156
Electra's Husband	70	Regional Roundup	16
How're We Doing?	6	Sales Guide News Letter	35
New Products	25	Advertising Index	15a

Next Month

Beginning in January the Contractors' News Letter and the Sales Letter will be taken out of the regular issues and will be mailed separately as a mid-month Industry News Letter. The January issue itself will feature a report on What the Electrical Industry in the West is planning for 1958. It will discuss the business climate, markets, contracting problems, load-building activities and association goals.

ADVERTISING REPRESENTATIVES

Atlanta (3)	Robert Powell, Rhodes Haverty Bldg.
Chicago (11)	Michael I. O'Connell, 520 N. Michigan Ave.
Cleveland (15)	Frank Seiler, R. A. Hubley, 1510 Hanna Bldg., Superior 1-7000
Denver (2)	John Patten, 1740 Broadway, AL 5-2981
Los Angeles (17)	Russ Antles, 1125 West 6th St., MA 6-9351
New York (36)	G. W. Simpson, 500 Fifth Ave.
San Francisco (4)	James Dickerson, Dick Alcorn, 68 Post St., DO 2-4600 T. H. Carmody, Advertising Sales Manager Bernice Johnston, Advertising Production Manager

Offices: Boston, Dallas, Detroit, Philadelphia, Pittsburgh, St. Louis

Electrical West (with which is consolidated The Journal of Electricity), DECEMBER 1957, Vol. 119, No. 7. Published monthly except November when published semi-monthly by McGraw-Hill Company of California, James H. McGraw (1860-1948) Founder. Office of publication, 235 N.W. Park Ave., Portland 9, Ore. See panel below for directions regarding subscriptions or change of address.

Executive, editorial, circulation and advertising offices: 68 Post St., San Francisco 4, Calif. Donald C. McGraw, chairman of the board; George C. Tenney, president; John W. Otterson, vice-president; B. M. Boccoli, secretary and treasurer.

Position and company connection must be indicated on subscription orders. Send to address shown in panel below. United States subscription rate $2 a year; single copies 25c (November directory issue $1). Latin American Republics $2 a year; Canada $2.50 a year; all other countries $3 a year. Entered as second class matter, Dec. 17, 1956, at the post office at Portland, Ore., under the act of March 3, 1879. Printed in U.S.A. Title registered in U. S. Patent Office.

© Copyrighted 1957, McGraw-Hill Company of California.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Subscription Manager, Electrical West, 68 Post St., San Francisco 4, Calif. Allow 30 days for change of address.

Postmaster: please send notice 3579 to Electrical West, 68 Post St., San Francisco 4, Calif.

L-o-n-g 10-Foot Lengths of L-M Permaline Conduit Save Time, Labor for PEPCO

•••Three 13.2 KV feeders and 32-duct secondary service to 452-apartment building handled with 4-inch L-M Fibre Conduit.

•••10-foot lengths cut number of couplings to be connected on the job.

Potomac Electric Power Company has just installed underground electric service to a new, all-electric, 452-apartment building in Washington, D. C. Long 10-foot lengths of Permaline fibre conduit were used to speed installation of three 13.2 kv feeders and a 32-duct secondary service.

Service is 120/208 volts, three-phase, four-wire for lights and miscellaneous power, from three 500 kva network transformers, and 265/460 volts for air-conditioning compressors, radial from two transformers. The 120/208 volt service has 16 cables per phase of 500 MCM 1/c non-lead 600 volt cable, and four neutral cables of 500 MCM bare copper.

Fast, Labor-Saving Installation

L-M Permaline conduit is light, easy to handle, easy to install. Joints are quickly and easily made by simply tapping the tapered coupling onto the tapered end of the conduit. Joints are watertight and safe from seepage of wet concrete.

Long lengths and easy method of joining L-M Permaline fibre conduit also permit use of narrow trenches. This results in savings in cost of concrete and man-hours required to dig and backfill the excavation.

Complete Accessories

L-M Permaline fibre conduit is made in 5, 8, and 10-foot lengths. Available diameters are 2, 3, 3½, 4, 4½, 5, and 6 inches. L-M offers a complete system for conduit installations. Accessories include bends, bell ends, adapters, couplings, and base and intermediate spacers.

Get Complete Information

Ask the L-M Field Engineer for a copy of the 12-point plan folder which shows how easy it is to use the Permaline system; and L-M's unique Underground Construction Handbook, which gives complete specifications. Or write Line Material Industries, Milwaukee 1, Wisconsin.

POTOMAC ELECTRIC POWER COMPANY crew installs secondary run of Permaline conduit from apartment building to manhole. L-M's extra-long 10-foot lengths of Permaline conduit speed installation. Permaline is light, easy to handle, and easy to install.

THIRTY-TWO RUNS of 4-inch Permaline fibre conduit, encased in concrete, were installed by PEPCO to serve 6,700 kw load in new apartment building. L-M Permaline conduit has a smooth inner bore; cable is easy to pull and sheath is not cut or marred.

324

LINE MATERIAL Industries

MCGRAW-EDISON COMPANY

McGRAW-EDISON

Permaline Fibre Conduit

BPI

This seal is your guarantee of recognized quality in Bituminous Fibre Conduit.

1. FULL LINES OF LUMINAIRES

2. FULL CONTROL LINE

Four reasons to specify General Electric

When you place your street lighting business with General Electric, you buy more than quality products alone. You get a complete package of products AND service backed by engineering skills and research findings. You get benefits which have come about through years of experience in serving the public lighting needs of the nation.

Specifically, here's what you can draw on when you work with General Electric in developing a ***vision-engineered system*** for best lighting of your streets:

1. FULL LINES OF LUMINAIRES

Whatever the application—whiteway, main street, primary or secondary traffic artery, residential street, highway, bridge, viaduct, underpass—you can choose from ***all three*** light source types: filament, mercury, and fluorescent. Only General Electric offers you full lines of all three!

Since G.E. offers complete selection, you know we have no "axe to grind" in recommending one luminaire type over another. The advice you get will be impartially based on the engineering and economic facts for your particular situation.

2. FULL CONTROL LINE

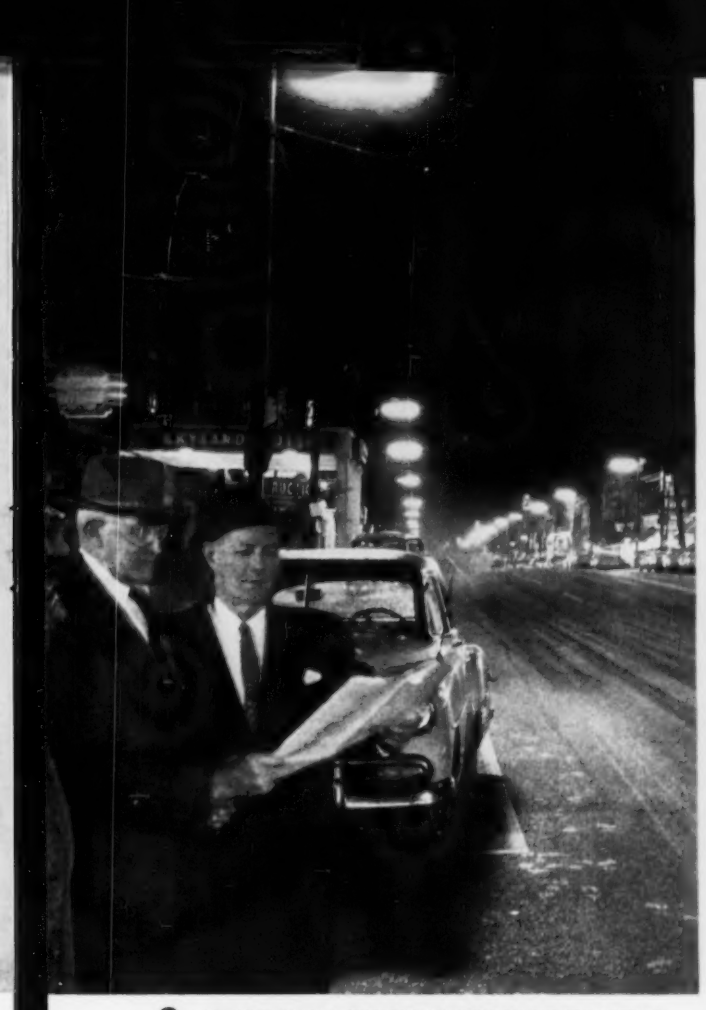
General Electric's full line of circuit equipment will integrate your street lighting into a dependable, efficient system, no matter what the situation may be!

For every combination of factors affecting control and protection—type of light source used, circuitry, wiring, etc.—a different solution is required. Experienced General Electric lighting specialists will utilize proved equipment to develop a control system exactly suited to your needs.

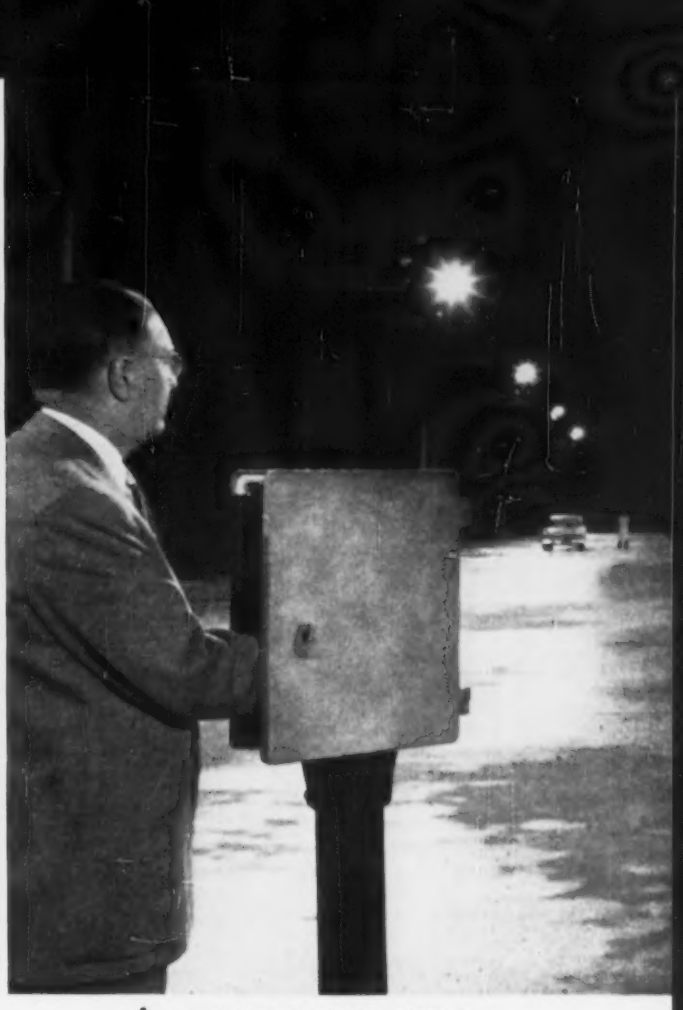
3. START-TO-FINISH APPLICATION HELP

Initial survey, preliminary application investigation, action recommendation, complete Illuminating Engineering Report for your staff or consultants . . . these services are included in the application aid "package" at your disposal when you place your street lighting business with General Electric!

Experienced General Electric outdoor lighting specialists are located in every major city. Backing these field specialists are more career lighting men at the Hendersonville, N. C., plant. The talents of both groups are available to you at all times.



3. START-TO-FINISH APPLICATION HELP



4. RESEARCH LEADERSHIP

vision-engineered street lighting systems

Benefit from the years of street lighting experience General Electric has gained since Thomas Edison lighted the street in front of his home in 1879! Put this know-how to work devising the best means to bring greater visibility to your city's streets!

4. RESEARCH LEADERSHIP

At General Electric's "Outdoor Lighting Center of the World" in Hendersonville are located the industry's newest and most complete laboratory, development, and proving facilities.

These facilities are being used on present, as well as future, problems. For example, a fully equipped photometric laboratory assures you precise accuracy of light output measurements and distribution curves for all types of equipment. Another example: four full-sized demonstration streets provide an authentic means for application experiments involving many different street lighting variables.

Moreover, special tests are run for customers, at their request, by a trained, professional engineering staff wholly devoted to ever-greater advances in the art and science of public lighting.

INVESTIGATE NOW!

Let your Apparatus Sales representative or authorized agent help you get the optimum amount of *vision* from an integrated *system* which is *engineered* to your particular street lighting situation! General Electric Co., Schenectady, N. Y.

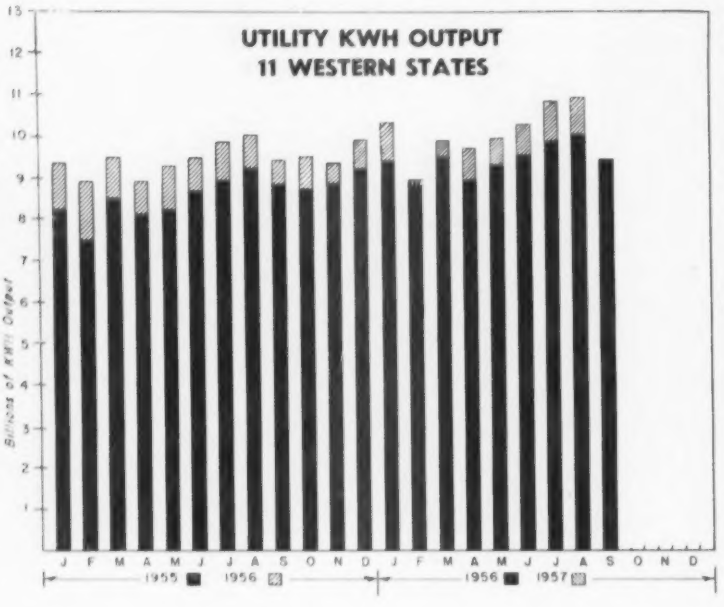
452-172

LIVE BETTER ELECTRICALLY

VISION-ENGINEERED STREET LIGHTING SYSTEMS

GENERAL ELECTRIC

----How're We Doing?



Output Comparisons

Year-to-year Kwh Output Changes in Western Regions and U. S.
Per Cent Changes Over Same Week One Year Ago

Week Ending	Rocky Mountain	Pacific Southwest	Pacific Northwest	U. S. Total
Oct. 12	+3.2	+7.7	+3.8	+3.6
Oct. 19	−0.3	+2.9	+1.4	+3.1
Oct. 26	0.0	+3.9	+2.4	+3.5
Nov. 2	−1.1	+4.5	−3.5	+3.2
Nov. 9	+2.4	+6.8	+3.1	+3.4

New Projects

General Controls is planning on a $4,000,000 addition to its Glendale plant. . . . A new $2,650,000 round high school will be built, a la Pentagon, by San Leandro, Calif., said to be very functional. . . . Washington State school authorities estimate outlays of $25,000,000 a year until 1965 for new facilities. . . . Long Beach, Calif., is slated to get a $10,000,000 entertainment center. . . . United Biscuit Co. is planning on an $8,000,000 bakery plant in Denver. . . . Scottsdale, Ariz., to get $7,000,000 housing development.

Cross Currents

Business is good but it seems to have lost some of its buoyancy. Steel output has not enjoyed its expected upsurge this fall; the stock market turned in a very poor performance; fall consumer splurging did not materialize; carloadings are off. On the other hand, electric power use continued to rise at a satisfactory rate; Sputniks and Poochnick touched off a reassessment of government spending; and housing moved up slightly in the past month. If all this sounds conflicting and confusing—it is, even to the economists. Their consensus seems to be that a business slide-slip rather than a dip is in prospect.

ELECTRICAL WEST'S
Editorial Advisory Board

Pacific Southwest Region

J. F. Davenport, Executive Vice-President
Southern California Edison Co., Los Angeles
R. H. Cockfield, Business Agent
Department of Water & Power, Los Angeles
Joseph Pengilly, Vice-President
Square D Co., Los Angeles
Leonard Hobbs, President
Smoot-Holman Co., Inglewood
Harry Gerster, Vice-President
General Electric Supply Co., Los Angeles
Sidney Hill
Hill Electric Co., Los Angeles
C. M. Smith, Sales Manager
Fluor Corp., Los Angeles
Victor Hartley, Managing Director
PCEA, Los Angeles

Northern California Region

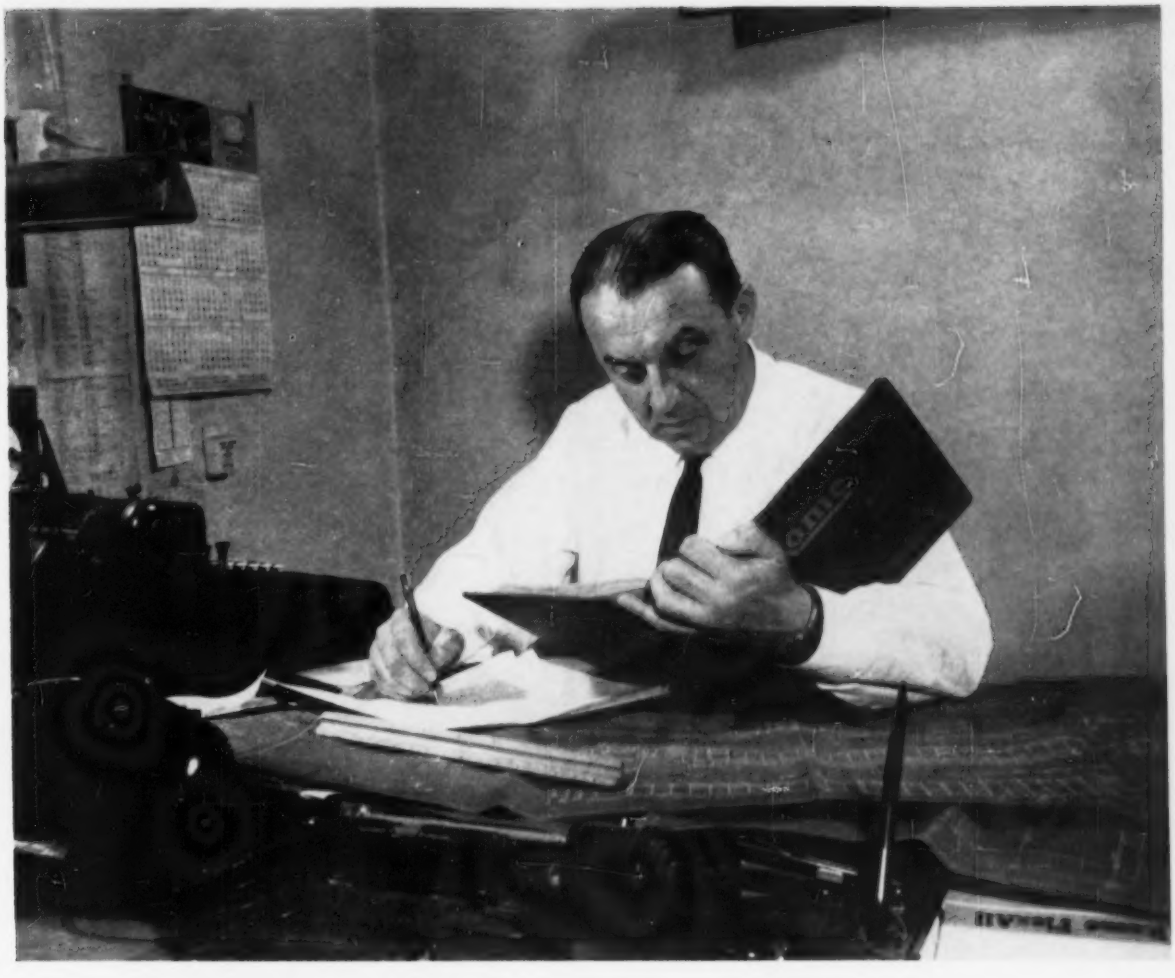
Walter Maytham, Vice-President
Westinghouse Electric Corp., San Francisco
Norman R. Sutherland, President
Pacific Gas & Electric Co., San Francisco
Fred Nicholas
F. M. Nicholas Co., San Francisco
Alfred H. Meyer, President
Leo J. Meyberg Co., San Francisco
Arthur Dahl, Sales Manager
General Electric Supply Co., San Francisco
Paul Churchill, Regional Manager
Line Material Industries, South San Francisco
George Abbett, President
Abbett Electric Co., San Francisco
Karl Bausch, Chief Electrical Engineer
Bechtel Corp., San Francisco
Walter Bayha
Bayha, Weir & Finato, San Francisco

Intermountain Region

Don Hitchcock, Manager
Graybar Electric Co., Denver
R. D. Moody, Manager
Allis-Chalmers Mfg. Co., Denver
David B. Hyer Jr., President
Southern Colorado Power Co., Pueblo
R. W. Akerlow
Stearns-Roger Mfg. Co., Denver
Don Larson, Mgr., Rocky Mt. Chapter
NECA, Denver
Ralph Johnson, Vice-President & General Manager
Sturgeon Electric Co., Denver
Ken G. Eaton, District Manager
Anaconda Wire & Cable Co., Denver
Howard Peterson
Peterson Co., Denver
Ralph Hubbard, Managing Director
RMEL, Denver
W. W. Bowman, Director of Publicity
Utah Power & Light Co., Salt Lake City
A. E. Fleming, District Manager
General Electric Supply Co., Salt Lake City
John Kimball, Vice-President & General Manager
Idaho Power Co., Boise

Pacific Northwest Region

Eric Nelson
Shaffer & Nelson, Seattle
Charles C. Cutter, Northwest Representative
Federal Pacific Electric Co., Seattle
Ralph James
Northwestern Agencies, Seattle
R. B. Lane, President
Industrial Electric Co., Seattle
Beverly Travis, Consulting Engineer
Seattle
Eugene Starr, Chief Engineer
Bonneville Power Administration, Portland
Thomas W. Delzell, Chairman of Board
Portland General Electric Co., Portland
D. R. McClung, Executive Vice-President
Pacific Power & Light Co., Portland
James F. Grieve, Vice-President
C. C. Moore, Engineers, Portland
Max Wood
Schwager-Wood Co., Portland
Larry Rodgers, Manager
Oregon-Columbia Chapter
NECA, Portland
R. H. Sroufe, Executive Vice-President
Stubbs Electric Co., Portland
Alden F. Krieg, Managing Director
NELPA, Portland
Jack D. Stevens
Puget Sound Utilities Council, Seattle

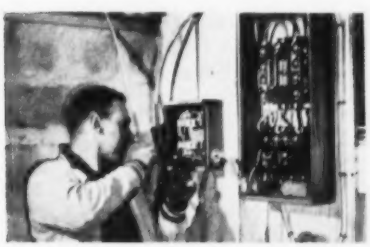


Rome's SE Style U cable lets you . . .

Submit lower bids on 100-amp service jobs

To meet today's highly competitive conditions, you can trim as much as 15% from your bids for 100-amp service jobs—where voltage drop is no problem.

Using Rome's SE Style U service entrance cable, you can substitute No. 3 AWG copper conductors for the more expensive No. 2 AWG. This money-saving substitution is possible because Rome's SE cable has UL approval for 75°C operation in either wet or dry locations. A reinforced rubber moisture seal under the weather-resistant braid gives Rome's SE cable its own built-in "dry location."



Installation ease Rome's SE cable can be installed in a hurry. Conductors are easy to identify; and the cable is always easy to handle because it resists becoming tacky, even under severe storage conditions.

Neat appearance The neutral-gray weatherproof finish will readily blend with the outside color schemes of most houses, and can easily be painted when necessary.

Easy identification You'll save wiring time because the combination cotton-glass braid on each conductor is colored for easy and quick identification—one black and one red.

Let Rome's SE Style U service entrance cable help you bid lower on your next job. For more information, contact your nearest Rome Cable distributor—or write to Department 369, Rome Cable Corporation, Rome, N. Y.

ROME CABLE

CORPORATION

Easier to Handle. The lightweight construction of Rome's aluminum Triplex makes it easier to handle and quicker to install than open-wire drops.

Neater Appearance. This self-supporting service drop cable offers neat appearance of a single cable assembly compared to open wires.

Rome's lightweight aluminum Triplex goes up

Some of the other benefits provided by this service cable

The construction features of Rome's aluminum Triplex lead to still more savings:

Costs less. Initial cost is lower than conventional copper Type SD service drop cable.

Lasts longer. Maintenance and service interruptions are few compared to open-wire installations. It offers maximum resistance to storms, wind, and ice loading.

Fewer poles required. Fewer poles are required and longer spans are possible with mid-span taps on secondary Triplex.

Less hardware needed. Service tap connections at the pole require less hardware than a conventional three-wire tap.

You have a choice of Roprene (neoprene) or Rolene (polyethylene) insulation. Either one withstands the severe effects of sunlight, heat, moisture, corrosive atmosphere, and other common hazards.

Specify Rome's aluminum Triplex for your next job. Contact your nearest Rome Cable representative for more information —or write to Department 366-A.

much faster than open-wire service drops

That means real savings in on-the-job manpower costs

Reduce your service-drop installation time—even by a few minutes—and you save money. Now it's possible to speed up practically every job.

High dollar savings. Rome's aluminum Triplex can be installed much faster than open-wire service drops. Multiply the time it saves by the high cost of keeping your crew on the job, and you'll see how great the savings are in manpower costs alone.

Why such savings are possible. The lightweight construction of Rome's aluminum Triplex is behind these important savings. This single cable assemby weighs less than conventional copper three-wire service drops, so it's easier to handle and quicker to install.

Rome's aluminum Triplex offers simplicity in construction. A self-supporting cable, it consists of specially insulated power conductors spiralled around a "straight-away" neutral conductor. Less handling is required to pull it off the truck, string it, and connect it than conventional three-wire service drops.

You can purchase this economical service drop cable in handy 500-foot cartons, paper-wrapped coils, or on non-returnable reels.

Specify Rome's aluminum Triplex for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 366-A and ask for Bulletin RS-5. Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

news roundup

FUTURE—When all of the dust settles after the various private-public ownership squabbles pending, you will find some new ones to occupy your attention.

The Senate public works committee has released a long-range hydroelectric power development program for the Arkansas, White and Red River basins in the Southwest. This is the result of seven years of study by an interagency committee authorized in 1950. The study covers 44 hydro projects with an ultimate planned capacity of 2,000,000 kw and requiring a capital expenditure of more than $5 billion.

As usual, the report is full of possible problem spots. For example, Percival Brundage, budget director, says it does not furnish an adequate basis for the authorization of specific programs and projects. Jerome K. Knykendall, FPC chairman, said the projects will be economically feasible only so long as they are considered peaking power projects. Steam electric sources would be needed for base-load requirements, he said. With this factor in mind the marketing of the power becomes important. In effect, it means that the power will be feasible only on large integrated systems and this almost certainly rules out many preference customers.

Want to bet that it virtually rules out most of the projects?

—EW—

Clayton Allen, transportation head of Los Angeles Department of Water & Power, says 65% of his vehicles involved in accidents last year were either standing still or going less than 5 mph.

—EW—

WELCOME—A newcomer to the West, RT&E Co. of Waukesha, Wis., is building a plant near Portland to manufacture power distribution transformers and other distribution equipment. It will be located at Tigard.

Expected to be in operation next April or May, the new plant is costing about $250,000 and will cover an area of about 20,000 sq ft. C. W. Shaw is plant manager.

—EW—

RUMMAGE SALE—Portland Section of the AIEE raised $1,200 at an electronic rummage sale. Everything from crystal sets to electrocardiographs was on the block. More than 2,000 people attended the one-day affair.

Money from the sale was turned over to the Oregon Museum of Science & Industry for a memorial to F. O. McMillan, long a faculty member in the engineering department of Oregon State College.

—EW—

PIONEER—Arthur Vining Davis, the only living American who has seen and participated in every chapter of the aluminum industry's history in the United States, has resigned as chairman of the board and as a director of Aluminum Company of America.

Davis joined Alcoa in 1888 (it was then called The Pittsburgh Reduction Co.) and among many other achievements is credited with an important part in the development of aluminum transmission lines.

—EW—

HOPEFUL—Tacoma City Light still has hopes of being able to build at least one hydroelectric dam on the Cowlitz River, though it has been forced to terminate a construction contract on Mayfield Dam.

Dean Barline, utilities director, said the city has an "extremely good chance" of building the two dams originally planned after a U. S. Supreme Court review of an adverse decision by a state court.

—EW—

MONEY MAKER—Have you seen the pamphlet published by the National Rural Electric Cooperative Assn.? It attempts to show that the government has made money from REA loans and that no increase in interest rates is justified.

It attempts to sell the idea that for "the first time" the power companies, insurance companies and the Eisenhower administration are all united in demanding an increase in interest rates.

The booklet says the hard money policy "is a contrived policy, a conspiracy entered into by the Secretary of the Treasury, the Federal Reserve Board and the spokesmen of the various vested interest groups who benefit from the high interest rates created by this policy.

—EW—

Congratulations are in order to Edward F. Sixtus, vice-president of Federal Pacific Electric Co., who was recently awarded the 50-year Certificate of the National Electrical Manufacturers Assn. He received the award for a half-century of continuous service in the electrical industry at the NEMA annual meeting in Atlantic City, N. J.

—EW—

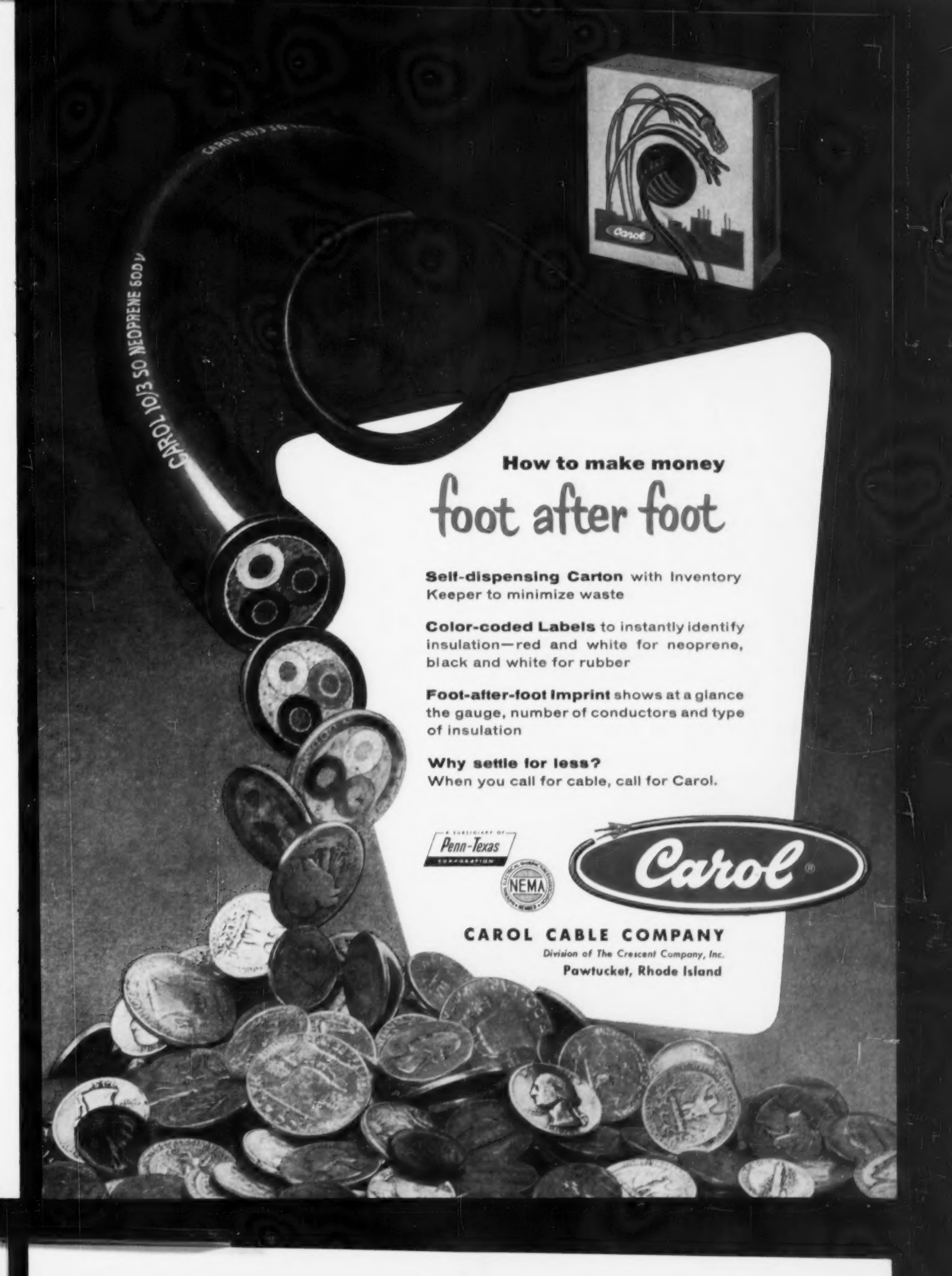
VISITOR—Casper, Wyo., employees of Pacific Power & Light Co. had an unexpected visitor recently. An 850-lb steer crashed through the glass door of the office in an attempt to get away from pursuers.

Keene Atwood, district office manager, commented: "It's the first customer we've ever had who was so anxious to get in he broke the doors."

The steer slipped on the smooth floor and stayed down long enough to be captured.

—EW—

LOT OF AIR—L. W. McConnell of the Indiana-Michigan Electric Co. recently pointed out the load advantages of pneumatic structures. "All that is required," he said, "to utilize



How to make money

foot after foot

Self-dispensing Carton with Inventory Keeper to minimize waste

Color-coded Labels to instantly identify insulation—red and white for neoprene, black and white for rubber

Foot-after-foot Imprint shows at a glance the gauge, number of conductors and type of insulation

Why settle for less?
When you call for cable, call for Carol.

A SUBSIDIARY OF Penn-Texas CORPORATION

NEMA

Carol®

CAROL CABLE COMPANY
Division of The Crescent Company, Inc.
Pawtucket, Rhode Island

THE TIME PROVEN
1929

FOR YEARS...
THE UNCHALLENGED
LEADER IN ITS CLASS

THE PORCELAIN PRODUCTS 1929 WIREHOLDER IS THE "STANDARD", BECAUSE OF:

Good Basic Design ✓
Sound Engineering ✓
Uniform High Quality ✓
Competitive Pricing ✓
Dependable Service ✓
Up-to-date Packaging ✓

Plus a complete, quality line of secondary service materials!

63 years
Electrical Porcelain Since 1894
PP INC
Porcelain Products, Inc.
CAREY, OHIO

the structural properties of air is a suitable membrane to enclose a space and a means of maintaining a slight pressure on the inside."

He reported that experimental slab buildings have already been constructed, including an electric bubble barn and that other designs are now on the market for storage warehouses, swimming pool covers, etc.

Sounds like a field day for little boys with beebee guns.

—EW—

HONOR—George C. Tenney, vice-president of McGraw-Hill Publishing Co. and publisher of Electrical West, has been elected a Fellow of the American Institute of Electrical Engineers. The citation, approved by the AIEE board of directors, states: "For important contributions to the advancement of electrical knowledge."

—EW—

IT'S DONE—At last they have done it. The first production model of an electronic reading automaton has already been contracted for, and is being built—in England.

The machine will be able to read printed sales records produced on cash registers, for one thing. If it can do this it is easy to see that its usefulness to an electric utility is a foregone conclusion.

Solartron Electronic Business Machines Ltd., Surrey, England, is the manufacturer.

You'll pardon us if they do not develop the thing so far that it can read ELECTRICAL WEST.

—EW—

H. A. Van Wassen of the Duquesne Light Co. recently told an AIEE audience that the Shipping Port Nuclear power station will have about the same load response and maneuverability as a conventional fossil-fuel plant operating on a utility system. In addition he pointed out that start-up and shut-down times compare favorably with fossil-fuel-type plants.

—EW—

PLANS MADE—National Electrical Week in 1958 is Feb. 9-15 and distribution of the Planning Guide and Kit of Materials is already under way. About 1,500 will be distributed.

NO CRASH—The National Society of Professional Engineers issued a statement aimed at curbing any Sputnik-inspired crash program for training engineers and scientists. Some items:

1. No special programs are desirable. Enrollments are at an all-time high and on the increase.

2. Crash programs might seriously hinder the quality of work done by the country's colleges.

3. Assumption that the earth satellite is the end result of Russia's scientific personnel inventory is unwise. Controlling factor was probably money and emphasis.

4. Present educational limitation appears to be in facilities and faculties, not in students. Any program must necessarily add faculties and facilities as well as students.

FINALLY—experience shows we have a tremendous reservoir of engineering talent that is available whenever the country wants to stop misusing the available engineering talent.

—EW—

In a paper entitled "Russian to English Machine Translations with Simple Logical Processing," two University of Washington authors conclude that the human brain can remember a million times more than present-day electronic brains.

Even if we can't remember our Social Security number.

—EW—

FAST—Hill Transformer Co., San Carlos, Calif., filled an order for three 4,000-kva-power autotransformers in just 29 days recently, for shipment to the Philippine Islands.

Designed for special voltage, the units were ordered by Atlas Consolidated, a mining company.

—EW—

School construction bond sales in August totaled $228,000,000, bringing the total for the 11-month period ending Aug. 31 to more than $2 billion. This means that money is available for a total of 110,000 classrooms for the coming year which would top the 1956-57 construction record by more than 40,000 classrooms. Looks like Young America will have a place to sit while learning its three Rs.

PROMOTIONS—Benjamin Electric Mfg. Co., Des Plaines, Ill., announces that John R. Bartizal is the new president of the company. Another person recently appointed is A. E. Swedenborg who was made vice-president in charge of sales.

Hoyt P. Steele, former president, resigned to make himself available for other business opportunities. He will continue to be a member of the board of directors.

—EW—

Sangamo Electric Co. has announced a lifetime guarantee on single-phase and polyphase watt-hour meters and on the watt-hour meter sections of all combination metering instruments. The portion of the guarantee that states the ball and jewel bearing system will never need relubrication, inspection or replacement is an industry first.

—EW—

Herb Leggett says: "There are several kinds of Flation. The best known, of course, are *in*-flation and *de*-flation. But these are both bad words, so the semanticists invented a couple of new terms: *re*-flation and *disin*-flation. They permit finer distinctions—and more involved explanations. But no matter how you slice it, the price of baloney keeps rising.

—EW—

NEWCOMER—A newcomer to the electrical industry happens to be one of the more famous names in the automotive industry—especially well known to anyone who gets a thrill out of fire engines.

Ward LaFrance Truck Corp. has created a new division to manufacture truck bodies for electric utilities.

You may want to learn what the company has to offer, and they will be happy to help you do so. Just write to them at 315 N. Tioga St., Ithaca, N. Y.

—EW—

EXPLANATION – Crystals, which grow as delicate plates from the surface of stainless steel, may explain for the first time a destructive failure of the metal known as "stress-corrosion cracking."

This new theory was revealed by Dr. Earl A. Gulbranson, advisory

The Size Type Rating Quality

to meet your most exacting requirements

Twist-Lock®

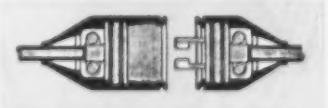
Illustration, below, shows size relationship of a Hubbell 4-wire, 50 amp. Twist-Lock cap and a midget 2-wire, 10 amp. Twist-Lock cap . . . a good indication of the wide range of sizes and ratings available to product engineers and designers of electrical equipment.

If your plans call for a lock-type electrical connection, "Twist-Lock" by Hubbell represents the finest, safest and most complete line ever developed. Caps, connector bodies, motor bases and receptacles are available in a wide variety of types and sizes, and in the ratings to conform to your electrical specifications.

Every cap and connector body from 10 amp. to 50 amp. in now available with "Seal-Tite" rubber covers for weatherproofing purposes, protection from dust and dirt or from hard knocks and rough usage.

"Seal-Tite" Rubber Covers for the complete line of "Twist-Lock" caps, cord connectors and male and female flush receptacles are recommended wherever moisture or breakage is a problem. Rubber closure plugs are also available for most "Twist-Lock" male and female receptacles.

"SEAL-TITE" RUBBER COVERS



"Seal-Tite" Rubber Covers feature a "bellows" action which effectively seals out moisture, oil, dust, dirt, lint, metal chips, etc. There is a "Seal-Tite" rubber cover or closure to fit every "Twist-Lock" device.

Write for 4-pg. brochure presenting the complete "Twist-Lock" Line.

HARVEY HUBBELL, INC.

HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

DEPT. R-1 BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE WAREHOUSE LOCATIONS

Scarborough, Ontario, Can.
1160 Birchmount Road

Bridgeport 2, Connecticut
State and Bostwick Streets

Chicago 7, Illinois
27 South Sangamon Street

Los Angeles 12, California
103 North Santa Fe Avenue

San Francisco, California
1675 Hudson Avenue

Dallas 7, Texas
1111 Dragon Street

EVERYBODY looks up to

Prodelin

Leading Worldwide Supplier of Parabolic Antenna Systems for Communication Services

There's much to be gained by using a Prodelin Parabolic Antenna . . . whether your application is for line-of-sight, point-to-point microwave communication, or for over-the-horizon tropospheric scatter service for long distance communications.

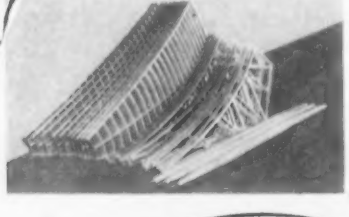
Early pioneering experience makes Prodelin the leader that everybody looks up to for quality.

Prodelin manufactures field proved parabolic reflectors with associated feeds providing the most complete antenna line in 2, 4, 6, 8, 10, 14, 18, and 28 foot diameters for every type of communication requirement.

If there is not a stock Prodelin antenna to suit your specific needs, Prodelin will design one for you. In active service throughout the world are rugged Prodelin aluminum mesh antennas that withstand 150 mph windloads fully iced . . . economical spun aluminum reflectors for similar services . . . and the new sectionalized plastic reflectors . . . all designed for low cost, long distance transportation by land, sea, or air. Remember, a Prodelin antenna costs *less* than any other part of your system . . . and with *larger* antennas, you can achieve greater gains at lower maintenance costs!

No wonder everybody looks up to Prodelin . . . it's head-and-shoulders above the crowd.

28 ft. Tropospheric Scatter Antenna



28 ft. antenna knocked down for air freight shipment

Write today! Get complete technical information on Prodelin Parabolic Antenna Systems including associated transmission lines and other RF network devices all terminating with industry's latest RETMA standard fittings.

"WORLD'S FINEST ANTENNA SYSTEMS"
Prodelin Inc
KEARNY, NEW JERSEY, U.S.A.

Dept. EW, 307 Bergen Avenue, Kearny, N.J.

chemist at the Westinghouse Research Laboratories, Pittsburgh, Pa.

What it means is that stress-corrosion cracking can be triggered even by such mildly corrosive substances as steam or human perspiration, and it occurs in objects subjected only to the internal stresses left in them during their manufacture. Stainless steel pipes, turbine blades—even coffee urns and cooking vessels can fail by stress-corrosion cracking.

Keep your hand off turbine blades.

—EW—

KUDO—The engineering manpower section that you saw in the November ELECTRICAL WEST will be circulated to virtually every campus in the United States. It is hoped that from it will come attention to the career opportunities in the Western electrical utility industry—and new manpower.

The brochure, called "The Challenge of Electric Power," is the brainchild of ELECTRICAL WEST's newest editor, Jack D. Robinson, who handles the engineering department.

If the brochure lacks anything it is a roundup on Robinson himself, who is an electrical engineer who has proved to have the versatility to adapt himself so well to the publishing business—and to produce a brochure of the quality of "The Challenge of Electric Power."

—EW—

Pole line hardware manufacturers have organized as a new section of the National Electrical Manufacturers Assn. Albert R. Warhner of Line Material Industries is chairman and E. R. McCoy of Joslyn Mfg. & Supply Co. is vice-chairman. The new section was formed to continue the work of the Line Hardware Institute, which has been discontinued.

—EW—

LINGUIST—An electronic power network computer designed by Waldo Enns, chief system engineer for Portland General Electric Co., will soon be doing its "thinking" in Turkish.

The computer is on its way to Ankara for delivery to the Turkish Central Power Commission.

Electronic Contractors Inc., builder of the machine, is sending Richard Raupach with the machine to install it and instruct Turkish engineers in its use.

"I Am Ambitious Of Your Esteem"

Captain John Paul Jones:

To the Countess of Selkirk, in 1778, Paul Jones wrote ". . . I am ambitious of your esteem and friendship, and would do anything, consistent with my duty, to merit it."

After his men of the "Ranger" had commandeered the Selkirk's silver, Jones had privately promised to return it. Buying it from his crew for 140 English pounds, he returned the silver to the Countess in 1784. The Captain kept his word and won her lifelong esteem.

For more than a century, Kerite has been ambitious of your esteem—by building the most lasting cable yet known. And more than three generations of Kerite craftsmen have given of their inherited skill and craftsmanship to assure the long life and service of Kerite Cable. The Kerite Cable Company takes pride in the fact that their product is chosen by buyers of integrity to safeguard installations around the world.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

Founded 1854

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston;
4101 San Jacinto, Houston 4, Texas; 1010 Euclid Avenue, Cleveland 17, Ohio;
29 West Lancaster Avenue, Ardmore, Pa.

EW

regional roundup

Pacific Northwest

► "Seattle is a flourishing mill town across Puget Sound from Port Madison." This is a quote from a New England geography published in Boston about 100 years ago.

Your correspondent recently visited Port Madison, which was also once a mill town and port of considerable importance on Bainbridge Island, and found it a charming residential section, as are many other settlements on the island. Ferrying to the mainland from Winslow, the only incorporated community on the island, to seek out Puget Sound Power & Light's new headquarters at Bellevue, your correspondent found Seattle still flourishing, which may be the understatement of the month since it now accommodates a half-million persons or more.

Continuing east across Lake Washington on the floating bridge, he found Bellevue a happy combination of lovely residences and spanking new commercial and industrial centers with some 18,000 inhabitants, and said to be the fastest growing community in the state. Here Puget Power operating departments occupy a beautiful new building of steel and glass with all modern conveniences including air conditioning, cafeteria, auditorium, conference rooms, automatic elevators and a wide variety of two-tone color schemes.

Puget Power is promoting its business principally in three phases, emphasizing its all-electric rate, modern wiring and area development, according to R. F. ("Reg") Plymire, vice-president in charge of general sales development. Every new home equipped for electric cooking and water heating can post a plaque certifying that it qualifies for Puget's all-electric rate. Attention of the homeowner is drawn to the measure of his wiring adequacy by another plaque showing the appliances his wiring can take care of and those for which it can be readily extended.

Area development is carried on against a background of industrial surveys produced by Arthur D. Little Inc. for each county served by the company. An area development department was organized under the managership of Stewart G. Neel, brought in from the Fayette County Development Council, Pennsylvania. Results are beginning to show. The Texas Co. has a new oil refinery under construction near Anacortes in Skagit County, and has contracted with Puget for 12,500 kw, beginning next summer. Allied Chemical and Dye Corp. will build a sulphuric acid plant on 16 acres adjoining the Texas and Shell oil refineries there.

► Down Portland way the street lighting program begun a little over two years ago reached a milestone the middle of October with the setting of the 10,000th mercury light. Carl H. Lundell, utilities engineer for the city, said that in the 27 months since the program was started, 238 miles of main arteries in the city had been covered with these modern lights. H. E. Peden, foreman of the Portland General Electric installing crew, had the honor of fixing the 10,000th light to a pole on S. W. Virginia Street. The program is not yet completed.

► A nice bit of public relations, so handled as to generate a substantial block of good will and send it in both directions, company to the people and people to the company, occurred in Troutdale, Ore., a few miles east of Portland, in October. Here Reynolds Metals Co. has one of its large aluminum reduction plants, and here the community decided to name its new $1,500,000 high school the Reynolds High School. Dedication of the new school was Oct. 22. Richard S. Reynolds Jr., president of the company, traveled to Troutdale at the invitation of the school board to deliver the dedicatory address. One thousand students, parents, school and company officials and friends came to the party, which included entertainment and dancing after the serious part of the program. The school board presented a handsome plaque honoring Richard Samuel Reynolds, founder of the firm, to the son, who in turn presented it to the school. He announced the awarding of a $1,500 annual scholarship to send an outstanding graduate to college.

► Fish are getting so popular around these parts lately that power men, politicians, and even laymen can tell fish from fishermen. An unusually heavy fall run of Chinook salmon appeared at the diversion tunnel of Idaho Power's Brownlee development on the Snake late in September. The company installed an electronic trapping device designed by the federal fish and wildlife laboratory at Seattle, and borrowed a 1,000-gal tank truck from Portland General Electric Co. to trap and transport fish by the hundreds to a point three miles above the project site. By the middle of October, 8,000 Chinook and steelhead had been thus assisted to their upstream spawning grounds. Eight hundred fifty fish a day was not an unusual haul.

PGE has been trapping and hauling fish around its Pelton project on the Deschutes River, Oregon, for 14 months. Lately the company tested out the attraction gate operation for its three-mile-long fish ladder at this project (world's longest) and found it satisfactory. The fish ladder and the downstream migrant passage is about 90% complete and trapping and hauling procedures will continue until these facilities are ready.

► After many years of selling through an agent in the Northwest, S. Morgan Smith Co. has established a direct factory sales office in Seattle at 143 34th Ave., N., with George E. Hochwalt Jr. in charge.

► "I want to know" is the theme of a new educational program for employees of Utah Power & Light

Allen-Bradley Line
of MOTOR CONTROL
includes Both!

D.C. **A.C.**

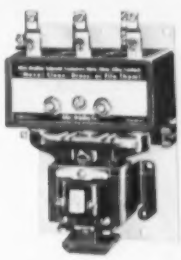
RELAYS AND CONTACTORS

Bulletin 200, Type G Relay. Rated: 5 amp, 64 v; 2 amp, 125 v; 0.5 amp, 250 v.

Bulletin 202 Contactor, Size 2, 1 Pole. Rated: 50 amp, 115-230 v.

D.C. relays are made with up to 8 poles. Also universal types, having contacts changeable from N.O. to N.C.—or vice versa—by merely reconnecting the terminals. Up to and including the 150 ampere rating, D.C. contactors are of the solenoid type; beyond this rating, up to and including 600 amperes, the clapper type construction is used.

Bulletin 700, Type C. Rated: 10 amp, 550 v max.

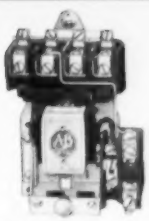


Bulletin 702, Size 2, 3 Pole. Rated: 50 amp, 550 v max.

A.C. relays are made in different types for various applications, with up to 8 poles. The universal type, having contacts changeable from N.O. to N.C.—or vice versa—is very popular. The A.C. solenoid contactors, made in 9 ratings up to 900 amp, 550 v max., will satisfy any service requirement. Silver alloy contacts are used throughout the D.C.-A.C. solenoid relay and contactor lines.

ACROSS-THE-LINE STARTERS

Bulletin 600, Form 52, double pole only, open type. Max rating: ¾ hp, 115-230 v.



Bulletin 209, Form 2. Max rating: 1½ hp, 115 v; 2 hp, 230 v.

D.C. manual starters have a rugged, snap action mechanism that prevents contact "teasing" and thus prolongs contact life. D.C. manual and solenoid starters have maintenance free, double break, silver alloy contacts. Motor overload protection is reliable.

Bulletin 600 in general purpose enclosure, complete with reliable overload breaker. Rated: 1 hp, 110-220 v.

Bulletin 709, Size 1. Rated: 7½ hp, 220 v; 10 hp, 440-550 v. Same general construction for max ratings of 300 hp, 220 v; 600 hp, 440-550 v.

All Allen-Bradley A.C. motor control is equipped with silver alloy contacts which are always in good operating condition. Because all A-B solenoid starters have only one moving part, trouble free performance and long life are automatically assured. It is the basic reason for Allen-Bradley's "quality" reputation.

MORE ON NEXT PAGE!

A-B QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

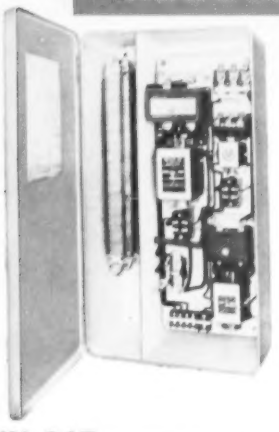
13-57-MB

...and more

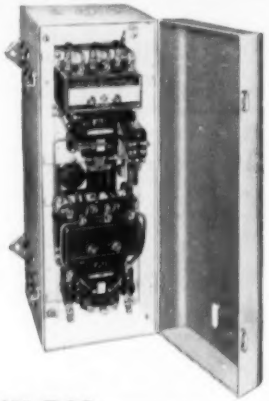
Allen-Bradley MOTOR CONTROL

D.C. | A.C.

REDUCED VOLTAGE STARTERS

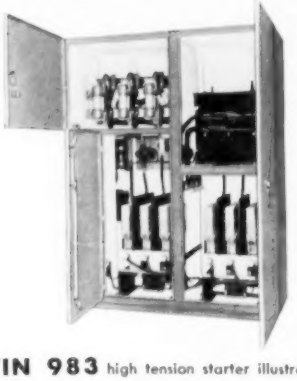


BULLETIN 267 are time limit, resistor type starters for automatic acceleration of constant speed shunt and compound wound D.C. motors. Solenoid contactors used up to and including Size 4 ratings. Max ratings: 75 hp, 115 v; 150 hp, 230 v.



BULLETIN 740 are graphite resistor type starters for automatic acceleration of squirrel cage A.C. motors. Made with 1 or 2 points of acceleration. Can provide velvet smooth acceleration for squirrel cage motors. Max ratings: 200 hp, 220-440-550 v.

BULLETIN 268 are time limit resistor type starters for automatic acceleration of adjustable speed shunt and compound wound D.C. motors. Designed for heavy duty service. Both Bulletin 267 and 268 starters available with or without dynamic braking feature, and also for reversing service. Max ratings: 75 hp, 115 v; 150 hp, 230 v.



BULLETIN 983 high tension starter illustrated above is of the reactor type, intended for starting synchronous motors. Available as an autotransformer reduced voltage starter; also in the across the line construction. The heavy duty, solenoid air break contactor assures long, trouble free life. Max ratings: 1500 hp, 2300 v; 2500 hp, 4600 v. at 0.8 P.F.

The Allen-Bradley *quality* line is *not* limited to alternating current motor control. A companion line of direct current motor control is available with the same outstanding *quality* . . . the same reliability . . . the same ability to "take it." Both lines are described and listed in our latest A-B Handy Catalog, and our trained field engineers will also be glad to help you with your control problems.

You cannot make a mistake when you insist on Allen-Bradley control.

A-B QUALITY

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

13-57-MR

Co. Some 92 sessions are being planned by Marlon Bateman, training director, in which every employee of the company system will get an opportunity to have answered or discussed any question about the company's operation that may be puzzling him. There are to be no holds barred. Bosses are excluded from sessions attended by their own employees and sessions will be kept small (about 20) to create an informal person to person atmosphere.

► The smiling voice and an improved personal contact technique is the aim of a new training program being carried on in Pacific Power & Light Co. Julia Kirkland, personnel training assistant, is directing the program, which is designed primarily to improve telephone manners and effectiveness. A tape recorder is an important tool in the program. Actual phone conversations with customers are taped, or test recordings are made so that the employee may hear how he sounds to others.

► *Names in Recent News* — Ben Torpen, well-known and highly regarded hydro engineer, one time with the army engineer corps, later with Pacific P&L, now retired, carried off the annual engineering achievement award of the Professional Engineers of Oregon.

► Roy Vernstrom, assistant general manager of PP&L, back from Europe with a group sent over to inspect the installations of Radio Free Europe, reported being most favorably impressed with the ability and dedication of the people operating these stations, and the effectiveness of the program.

► Three Puget engineers joined the ranks of the Professional Engineers of Washington by successfully passing that organization's examination in electrical engineering: John Brown of the system operations department, and Ray Pollard and George Dickson of the general engineering office.

► A. E. Grauer, president, British Columbia Electric Co., was awarded the National Sales Executives Trophy at Los Angeles last summer, as "Canadian Business Man of the Year."

► J. Harvey Leach, Western Division manager for Puget Sound Power & Light at Bremerton, was cited for outstanding service by the Washington "Employ the Handicapped" committee at its annual banquet in Olympia.

Pacific Southwest

► Modern resources to tackle an ancient problem are under consideration by seven California utilities. The power-generating agencies met in Los Angeles to map out a joint research and development project to investigate economical methods of converting sea water to fresh water.

In a meeting with representatives of the U. S. Department of Interior, the utilities discussed the possibility of using partly spent low temperature steam from steam electric power generating stations for the distillation. Feasibility of setting up a pilot test plant will be considered at a future meeting. Participating utilities include: Southern California Edison, Pacific Gas and Electric, Calectric, the Los Angeles Department of Water & Power, Pasadena Municipal Light & Power Department, and the public service departments of Glendale and Burbank.

► Graybar Electric has opened its $500,000 office and warehouse facility in Van Nuys to serve the San Fernando Valley and surrounding areas. The 47,000-sq-ft depot is stocked with utility, industrial and contractor materials as well as appliances, communication and electronic equipment.

► C. M. "Mose" Allen and Frank Gould of the Los Angeles Department of Water & Power conducted several thousand guests on an open house tour of the department's new 5,000-sq-ft heavy-duty mechanical shops and office building on Main Street in Los Angeles.

► Calectric has created a steam-electric generating department because of the growing importance of steam generation as the major source of power on the company's system. A. A. Lingo, superintendent of steam electric generation, has been appointed to head the new section. James N. Zornes, steam electric engineer, will be Lingo's assistant.

► Dan Miller has been named Western division manager of the Square D Co., with executive offices in Los Angeles. Previously the firm's Northwest regional manager, Miller now takes charge of all plant operations in Los Angeles, Seattle, San Francisco and Denver.

► The Illuminating Engineering Society heard a brace of speakers at its second study club meeting in November in Los Angeles. Phil O'Brien of the UCLA engineering department discussed the physics of light production, and Fred A. Wolfe, product sales manager of Sylvania Electric Products Inc., Salem, Mass., talked on the phenomenon of electroluminescence.

► And speaking of meetings, Charles Hayes of Electrical Estimators Inc. and president of the Southern California Electrical Maintenance Engineers Assn., says it's going to be hard for members to absent themselves from EMEA meetings on the excuse that they have to travel too far. The association is following up its earlier plan of area meetings in the Los Angeles Harbor and San Fernando Valley by extending the idea to the Pomona Valley sector.

► Don Frear of Thomas & Betts Co. is displaying his company's complete new line of connectors, which is being expanded to handle aluminum conductors as well as copper conductors all within the same tool. The display features a unique color-keyed system initiated to facilitate rapid installation of connectors.

► Stan Lindahl has sold out his half interest in Light Control in Los Angeles to his partner, Jay Bennett. Bennett, who held the title of vice-president, now takes over as president in place of Lindahl, who will continue his relationship with the firm as a manufacturer's representative. Bennett's wife, Rayle, is the new vice-president of Light Control.

Intermountain

► There's a glowing future for the electrical industry in the mountain states and it was never summed up any better than in a statement by a top General Electric executive.

He is R. C. Hawley of Louisville, Ky., general manager of the Appliance and Television Department of the General Electric Supply Co.

Hawley made his comment to ELECTRICAL WEST on the recent opening of G-E's new appliance and television branches in Denver and Albuquerque.

"The Colorado, Wyoming and New Mexico area," Hawley said, "is exciting to a businessman because of the vigor and enthusiasm of the people who live there and their readiness to accept and make use of new ideas."

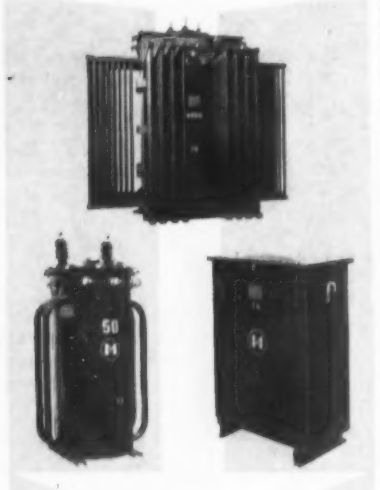
G-E has assembled a top-flight team to conduct its new operations, which were formerly through the B. K. Sweeney Co. at Denver and Electric Supply Co. at Albuquerque.

H. C. Davis is district manager for

you BENEFIT when you buy transformers from HILL

Our production facilities are geared to your needs. Our interest is in your transformer problem—to solve it quickly, and at competitive cost.

At Hill Transformer, this is exemplified by a policy of prompt delivery (to jobsite in quantity)... adapting designs to special customer requirements... all transformers manufactured to NEMA and ASA standards.



OIL FILLED • ASKAREL
DRY TYPES
through 5000 KVA

HILL

HILL TRANSFORMER CO., Inc.
1030 Washington St. • San Carlos, Calif.

Available from leading electrical wholesalers

the Denver branch that serves some 170 full-line dealers in Colorado, southern Wyoming and western South Dakota and the Albuquerque branch that will serve 65 full-line dealers in New Mexico and the Four Corners area of Colorado, Utah, Arizona and New Mexico. Manager of the Albuquerque office is Bob Padgett.

Among the key personnel at Denver are Fred W. Curle, sales manager; Edmund J. Glowski, operating manager; Norman V. Dawson, production service manager; R. D. Baker, credit manager; Arlin Schoemaker, chief accountant; Fred K. Hager, dealer development and sales training manager; Arthur D. Cross, advertising and sales promotion manager; and Mrs. Corinne Enochs, executive secretary.

The new distribution warehouse at 5390 E. 39th Ave. was opened formally at a four-day event in late November when dealers from throughout the region were invited to a showing of G-E's line, featuring the 1958 refrigerators.

► The electronic products of Fischer & Porter Co. of Hatboro, Pa., were shown in the Denver area in the firm's special trailer, which is 45 ft long with its tractor cab. The display features instrumentation systems, data reduction and automation equipment. Among the locations for the display were Martin Co., a missile plant, and Stearns-Roger Manufacturing Co., a leading builder of power plants.

► The new plant for Ramo-Woolridge Corp. of Los Angeles has been opened southeast of Denver. The Denver electronic instrumentation division is housed in a new building enclosing 140,000 sq ft on a 640-acre site. The present staff of 118 employees may be increased to 1,000 over the next two years, George Fennimore, plant manager, said.

► Central Electric Supply Co. of Denver was presented a third-place award in a sales promotion contest conducted by Lightolier of Jersey City, N. J. The Central's "Lighting Style Show" was directed by Edward S. Goldman, sales manager. The week-long event featured a statewide newspaper and radio advertising promotion that drew more than 600 visitors to Central's showrooms. "But the best part of it," Goldman said, "was that there were phenomenal sales results for more than two months afterwards. These were directly attributable to the style show."

► The Clyde P. Elliott Co. has leased expanded facilities at 661 Delaware St. in Denver to accommodate a growing business in 10 electrical lines. Elliott said a display room would be a feature of the added space. It will be arranged for meetings and conferences with architects and builders.

► Major electrical manufacturers joined in sponsoring the 39th annual Christmas lighting contest for Denver homeowners, businesses and institutions. They are Sylvania Electrical Products Co., Westinghouse Electric Co. and General Electric Co.

They are cooperating with the traditional sponsors—Rocky Mountain Electrical League, Denver Junior Chamber of Commerce, *The Denver Post* and Public Service Co. of Colorado.

Electrical appliances donated as awards are valued at more than $1,000.

Northern California

► Al Woronick, a generating station shift foreman for Pacific Gas and Electric Co., carefully manipulated a few controls and the needle on an a-c kilowatt dial began to move. Slowly the indicator moved—even hesitantly at times—until it finally reached the numeral "5." A generator was operating at 5,000 kw under his direction.

Now this is a modest amount of capacity, and certainly would not have caused much of a stir under any circumstances other than the ones in effect Oct. 24 near Pleasanton, Calif. The power behind the generator came from a General Electric Co. nuclear reactor.

To most members of the press corps that witnessed the event, it was charged with tension. There was no question of safety, but the intense concentration of the G-E men controlling the reactor and the watchful attitude of Woronick emphasized the dramatic moment.

George White, general manager of G-E's atomic power equipment department, and N. R. Sutherland, PG and E president, were on hand for the occasion, and Samuel Untermyer, G-E's manager of reactor operations, acted as guide and narrator. He designed the reactor.

Biggest thrill came when the visitors donned lab jackets and rubber shoe covers to go into the reactor housing. Again, it was perfectly safe but the mind could not ignore the tremendous force that was so silently at work beneath the floor.

This is the world's first all-privately financed nuclear electric power station.

► Northern California is welcoming Titan Metal Manufacturing Co., which has just started up a new facility at Newark. It is the only brass mill in the area. Products from the plant will be finding their way into the electrical industry via the products made in the West by other manufacturers. All product departments of the new plant will be in operation at about the time you are reading this. James M. Golden, manager of Titan's Western division, said the local labor force provided the new facility with some top-notch talent.

► John H. Maddox Co., San Francisco electrical manufacturers' representative, has taken on the products of the Ilsco Corp. of Cincinnati.

► Dudley Moore is the new district representative for Benjamin Electric Mfg. Co. in San Francisco. He is a graduate electrical engineer from the University of Washington and has been in the business for a number of years. Ray Bergman has been transferred from Sacramento to Los Angeles with Benjamin, to assume the duties of district representative. He has been with Benjamin four years.

► G. L. Call will come to San Francisco Jan. 1 from the Ohio Valley to be Central Pacific district manager of Graybar Electric Co. He has served in both Portland and Seattle during his 30-year career with Graybar.

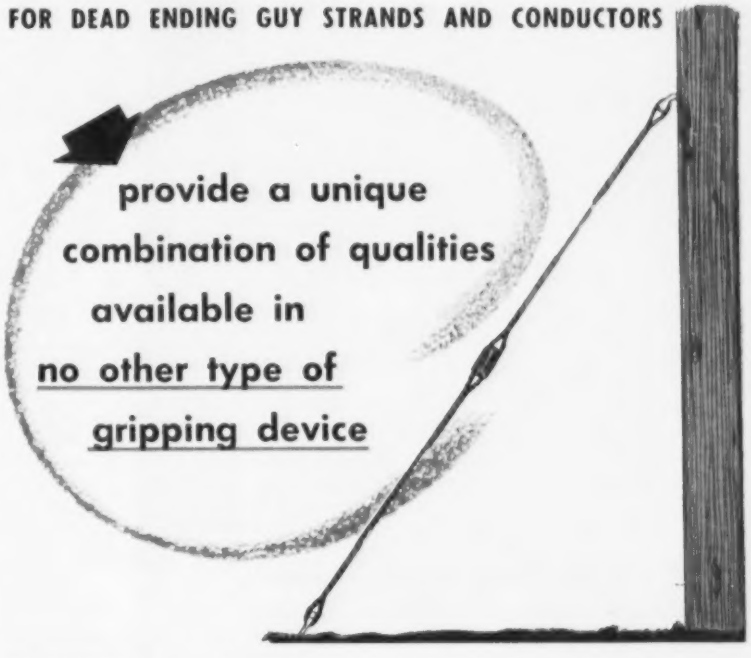
► Two new Westinghouse Supply Co. appointments have been announced in northern California. Douglas M. Cossitt is San Francisco branch manager and Milton J. Verseman is Sacramento branch manager. Cossitt replaces Dane Egbert, who joined Spang-Chalfant. Verseman succeeds Paul H. Hamre who takes over a Wesco executive position in Los Angeles.

► Edmund E. Wilkins, tower department superintendent at the South San Francisco plant of Bethlehem Pacific Coast Steel Corp., told those at the American Iron & Steel Institute that in the history of steel transmission towers "I can recall no tower failures from causes within the tower itself."

► A new chapter of the Illuminating Engineering Society is in the early stages of formation at Fresno. The Golden Gate Section is assisting with the founding of the unit. Temporary chairman is Irwin McMath. A meeting will be held Jan. 21 in case you know someone who might be interested in joining.

FANNER FANNGRIPS

FOR DEAD ENDING GUY STRANDS AND CONDUCTORS

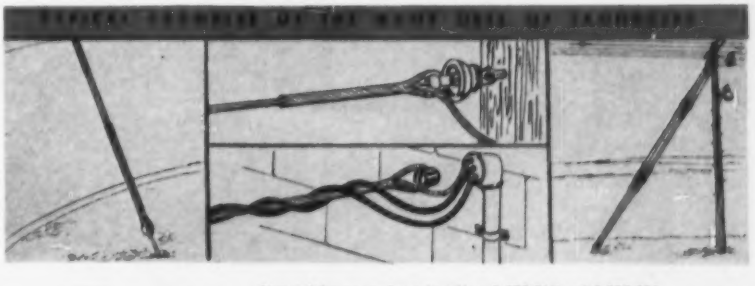


FANNGRIPS are made of highest grade spring-type wire by Fanner's exclusive roll-forming process. They provide a permanent and positive grip, and, because the frictional force is greater than the strand strength, FANNGRIPS cannot slip!

- Provide maximum load strengths — eliminate variables in application.
- Apply in a minimum of time — eliminate laborious field fabrication.
- Permanently tight, self-clamping — no movement or relaxation due to load reversal.
- Corrosion resisting.
- May be removed and reapplied when necessary.
- Do not damage surface of strands.
- Neat application without bulk — no dangerous or wasteful ends.
- Available in electro galvanized steel, copperweld or aluminum alloy.

No other dead-ending method matches FANNGRIPS economy!

WRITE FOR CATALOG



Licensed for use under patent Nos. 2,275,019 and 2,587,521

Fine Fanner Superformed

THE FANNER MANUFACTURING COMPANY
Electrical Products Division
BROOKSIDE PARK • *Established 1894* • CLEVELAND 9, OHIO
Telephone: SHadyside 1-6000

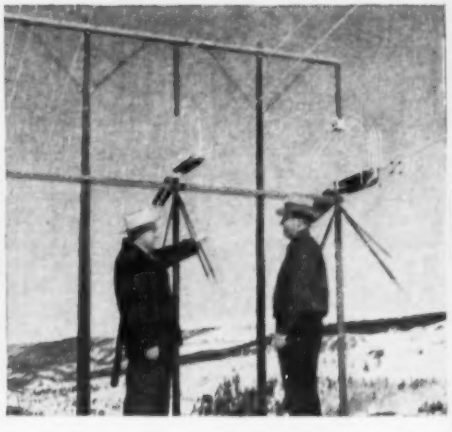
AGENTS and DISTRIBUTORS IN PRINCIPAL CITIES

ARMOR RODS • LINEGUARDS • TAP ARMOR
PATCH RODS • FANNGRIPS • PLASTIC FANNGUARDS
PLASTIC INSULATING TUBINGS AND MOLDINGS

Alcoa Field Advisors Help You Speed

Operation of new 12A lightweight Alcoa Compressor is explained by field advisor Ralph Huston (left) while making a call in the field.

On the spot to check stringing of Alcoa ACSR, Alcoa field advisor Bill Rice (left) first discusses the installation with the job foreman.



Sound, helpful advice is Alcoa field advisor Jim Sunderland's (left) stock in trade. Stringing crews welcome his solid experience on any job.

Construction, Reduce Line Costs

If you're talking transmission, distribution or substations . . . Alcoa field advisors are available to help you in three important ways.

INSTALLATION HELP . . . at the job site . . . to advise construction crews on the correct application of conductors, accessories and tools . . . to help solve special problems arising from terrain or type of erection equipment.

CONSULTATION . . . In the design stage, their advice on construction methods and equipment for installing Alcoa® Conductors and Accessories can be invaluable.

PRODUCT IMPROVEMENTS . . . From their detailed reports, written and passed on to both customers and Alcoa engineers, they aid in the development of even better aluminum conductors and accessories.

To bring you this extra service . . . at no extra cost . . . Alcoa has located field advisors at strategic points throughout the United States.

Each Alcoa field advisor, before he can be considered for appointment, has had many years of experience in conductor installation and maintenance. Before being assigned to his own territory, the new advisor spends several months with other Alcoa advisors to find out firsthand how he can be of greatest service to utilities and contractors. Later, frequent refresher courses keep him constantly up to date.

If you don't already know him, you'll find that your Alcoa field advisor is a competent, pleasant, helpful man . . . full of money-saving suggestions about stringing and sagging, welding aluminum or any of a host of important considerations in modern conductor installation. Just specify Alcoa Conductors and Accessories for your next installation and tell the Alcoa salesman you'd like the field advisor to drop around. You'll find him sincerely interested in your problems . . . and well qualified to advise you on them.

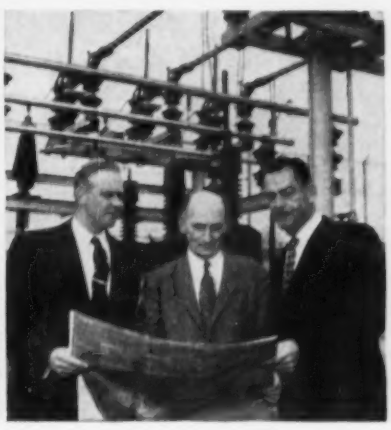
◀ On a rugged mountainside, Alcoa field advisor Shorty Lowe (left) makes a few suggestions on tackling the tough right of way that lies ahead.

ALCOA ALUMINUM
ELECTRICAL CONDUCTORS AND ACCESSORIES
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

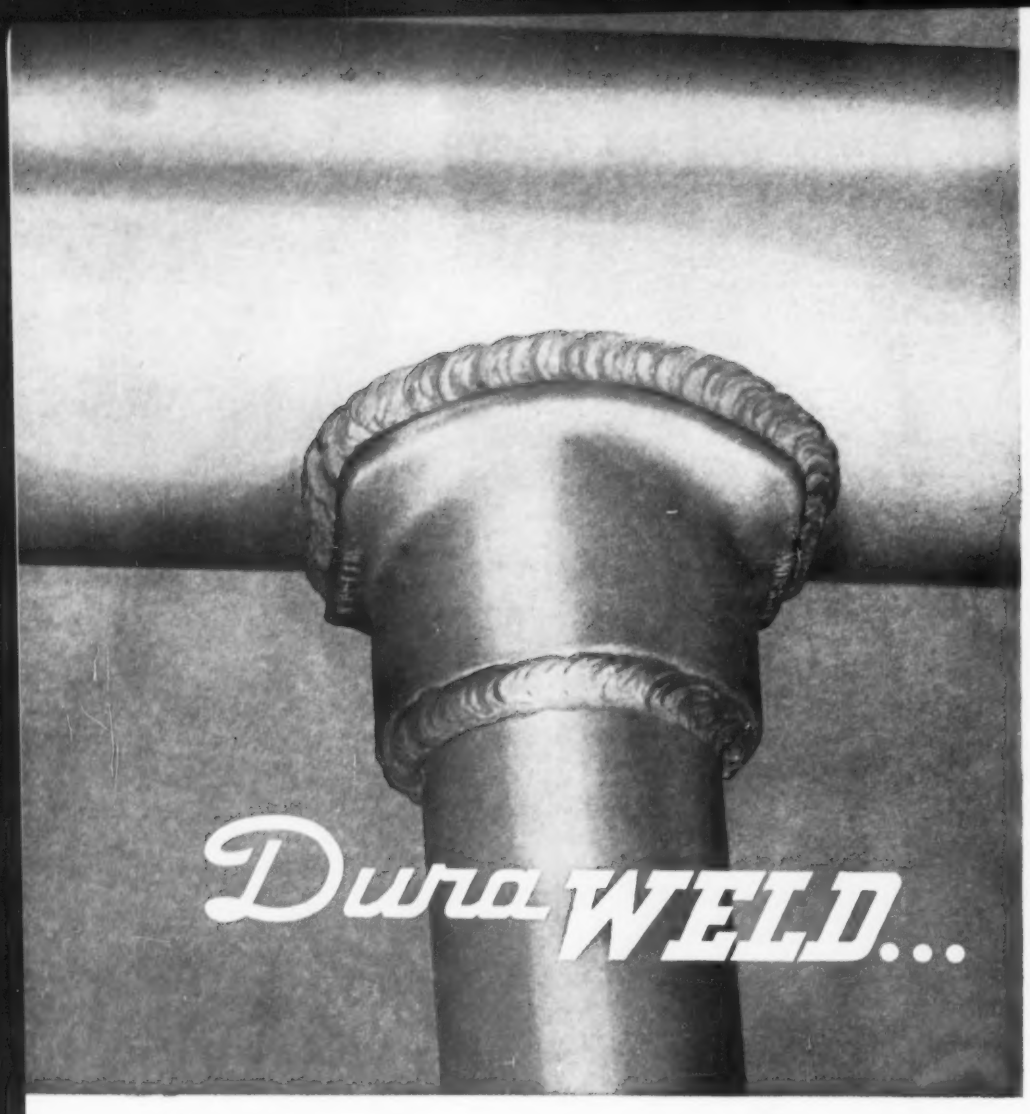
NEW! "ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

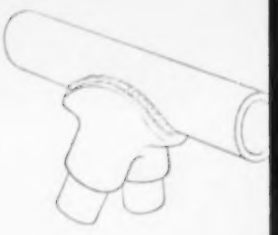
Field advisor Bill Colegrove spends a day checking up on some Alcoa ACSR, newly installed by a Midwest utility.

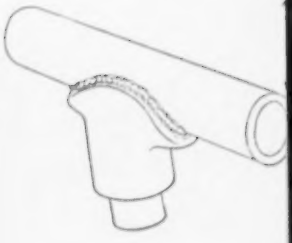


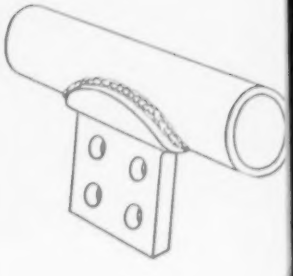
At a utility substation, field advisor Hank Meece (right) discusses the proposed addition of some new aluminum tubular bus.

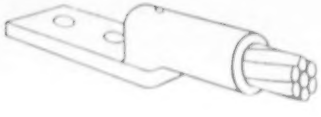
Snowshoes are standard equipment for field advisor Bob Hyde (right) as he inspects Alcoa ACSR covered with frozen snow.

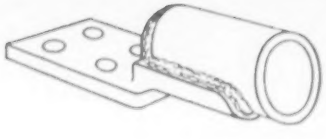


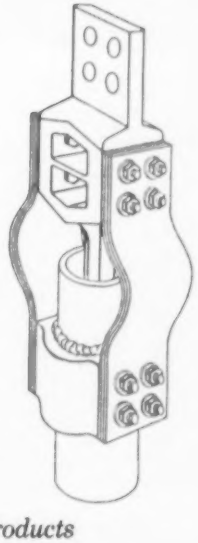












Now, Anderson Electric, who pioneered the development and use of aluminum substation connectors, again leads the field with Dura-WELD fittings for welded construction of aluminum bus. Designed for *ease* of welding and fitting of component parts, Dura-WELD fittings give you permanent, trouble free connections. Ask your Anderson representative for details on sizes and designs to meet your needs or write for information.

ANDERSON ELECTRIC CORPORATION • Birmingham 1, Alabama

Export Representative: International Standard Electric Corp.

ANDERSON ELECTRIC

Research / Quality / Performance / in Aluminum and Bronze Products

Aluminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION

Represented on the West Coast by:

Industrial Engin. & Equip. Corp.
417 S. Hill Street
Los Angeles 13, California
Telephone: Michigan 7794

Waltham, DeWitt & Krusi
1048 Monadnock Building
San Francisco 5, California
Telephone: GArfield 1-5054

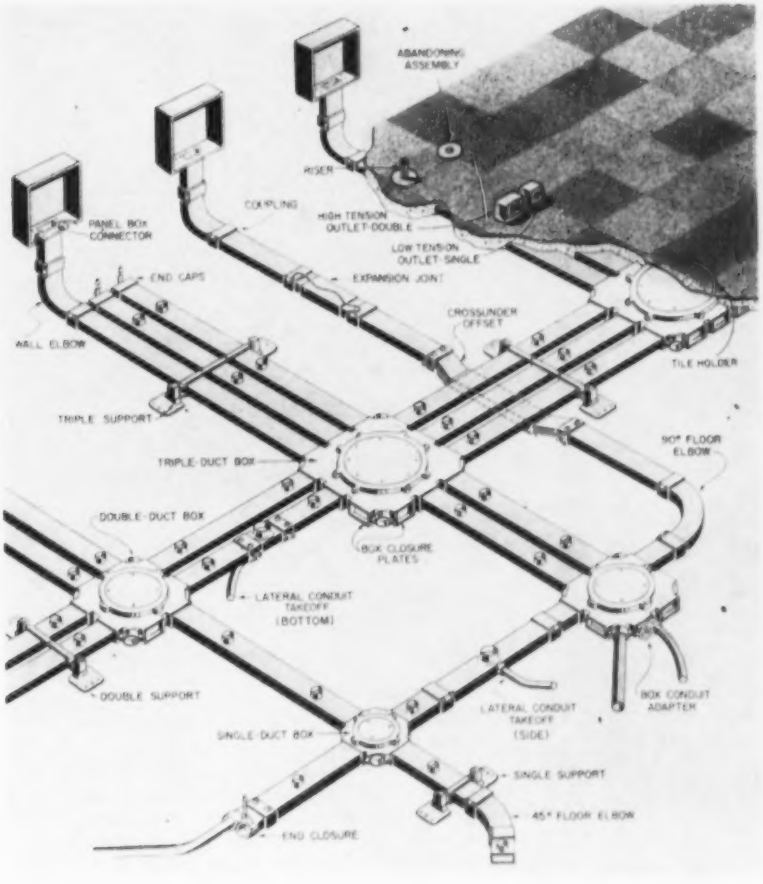
Hamilton Associates
1226 Elati Street
Denver 4, Colorado
Telephone: CHerry 4-1505

Clarence W. Silver Company
550 West Seventh South Street
Salt Lake City 4, Utah
Telephone: ELgin 5-5378

Muth-Richards Company
1804 Bush Place
Seattle 44, Washington
Telephone: CApitol 2128

PRODUCT NEWS

New Designs and Applications



Underfloor System

(1) *General Electric Co., Conduit Products Department, Bridgeport 2, Conn.*

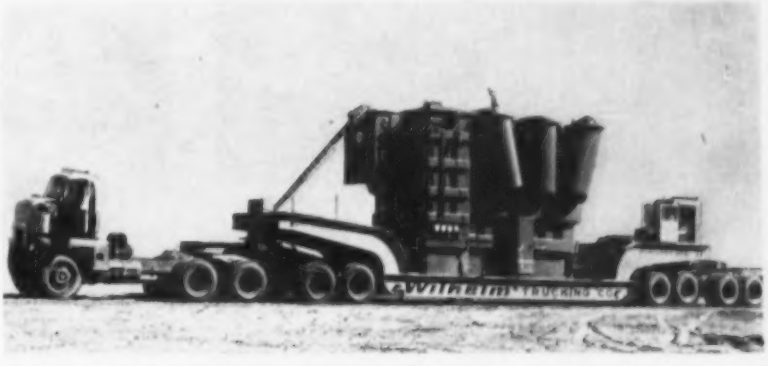
A new single-level steel underfloor distribution system has been developed for use in commercial, industrial and institutional buildings where shallow floor fills are used, or where cost is a determining factor. It is UL listed for installation in slab and fill or monolithic types of floor construction. It can be installed in floor fills as thin as 2½ in. The number of separate services required determines whether single, double or triple duct boxes are used. Complete mechanical separation of the various service circuits is maintained within the junction boxes. Floor outlets are of polished aluminum.

Distribution Transformers

(2) *Federal Pacific Electric Co., Pacific Switchgear Division, 5815 Third St., San Francisco 24, Calif.*

A new line of fully protected distribution transformers for utility and industrial services is announced by this company. Full current protection for ratings from 10 to 100 kva is provided, is the report. A second type is said to provide full current and surge protection. Both types incorporate internal circuit breakers.

Giant Trailer Works in Northwest

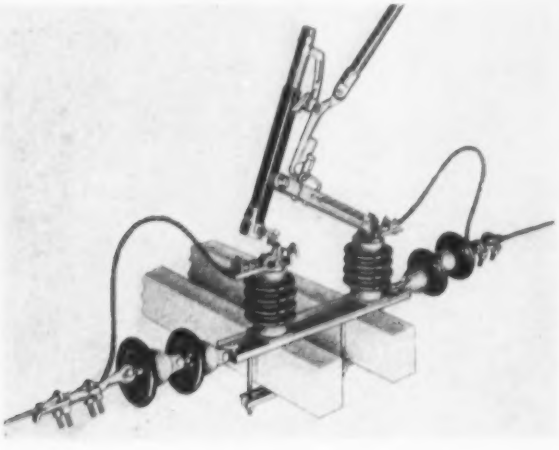


A piece of hauling equipment, large enough to move the biggest generator and transformer in Pacific Northwest hydroelectric projects, has been developed by Wilhelm Trucking Co., Portland. The small cab on the left rear side of the trailer is for an operator who controls a four-axle rear end steering assembly. The trailer operator communicates with the truck operator by means of an electronic telephone

Disconnect

(3) *S&C Electric Co., 4435 Ravenswood Ave., Chicago 40, Ill.*

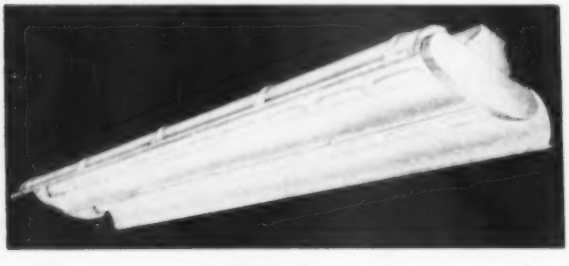
A new distribution device for use with this company's Loadbuster portable load break tool has been announced. The new disconnect is rated at 15 kv, 400 amp, and has an impulse withstand rating of 95 kv (or 110 kv for heavier types) and a momentary short time current rating of 20,000 amp. The ratings put the unit in the station-type disconnect class, yet is said to be priced in the same range as distribution disconnects.



High-Bay Fixture

(4) *Fluorescent Fixtures of California, 352 Shaw Road, South San Francisco, Calif.*

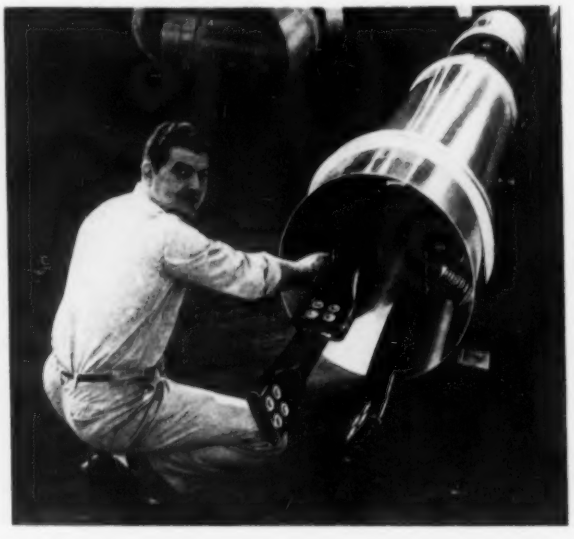
Designed to use the new Power Groove fluorescent lamps of General Electric Co., this new high-bay fixture has transverse shielding of 15° for glare protection. Side panel reflectors and center Vee reflector are curved in a parabola for high utilization of illumination. The new socket design permits any factory preset position from vertical to 30°.



Oil Circuit Breakers

(5) *Federal Pacific Electric Co., Pacific Switchgear Division, 5815 Third St., San Francisco 4, Calif.*

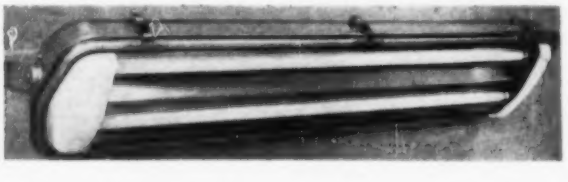
A new line of frame-mounted oil circuit breakers for 23-, 34.5-, 46- and 69-kv services utilizing drop-bar contract structure, hydraulic operating mechanisms, simplified mechanical linkage and new ASA standard bushings is available from this company. The drop-bar design of the new contact mechanism is said to provide efficient application of a minimum number of parts for simplified adjustment and maintenance. The breakers are equipped with standard type O interrupters based on the oil-condensation principle. The breakers have five-cycle opening and 20-cycle reclosing times.



Bus Structure

(6) *I-T-E Circuit Breaker Co., 19th & Hamilton St., Philadelphia 30, Pa.*

Recently announced by this company is a new development in bus structures. It is 4.16, 7.2 and 13.8 kv, 1,200-3,000-amp, nonsegregated phase bus that is completely sealed with cork neoprene gasketed split half round covers. The bus is completely insulated by air and porcelain insulators. No organic materials are used for insulation. The new product is said to be ideal for generator leads to transformers, for connecting transformers to switchgear assemblies, for interconnecting switchgear assemblies, and for distribution of light and power in factories and office buildings.



Floodlight Luminaires

(7) *Line Material Industries, 700 W. Michigan St., Milwaukee 1, Wis.*

A new line of two-lamp fluorescent floodlight luminaires, available in 4- or 6-ft lengths, is said to be the first specifically designed to accommodate either present standard or future higher output lamps. The units achieve the same optical efficiency as the company's recently announced four-lamp luminaires. Applications are airport ramp, dock, railroad underpass, tunnel or substation lighting. Units can be mounted singly or in "Vee" or "Delta" combinations.

Another KUHLMAN transformer on its way to help build a new Korea

KUHLMAN "Salesman of the Week"

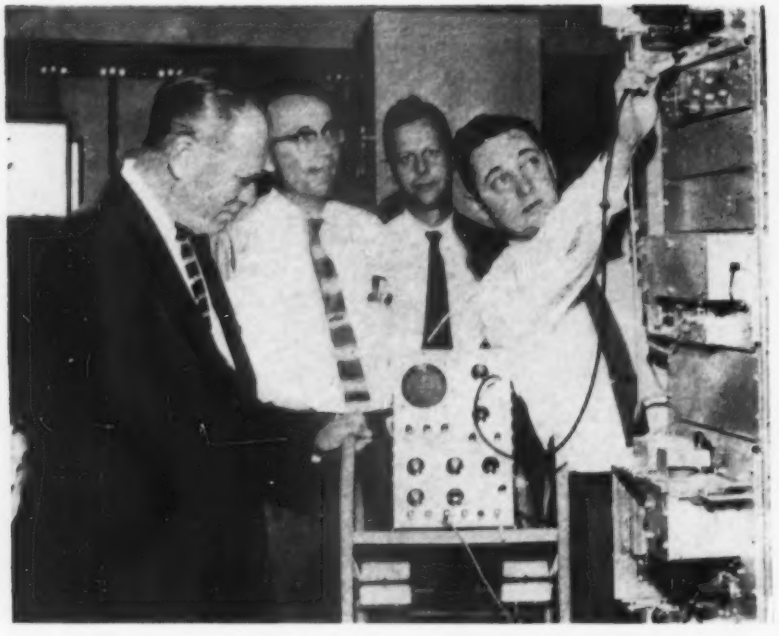
If you can identify this Kuhlman representative, notify Dept. SA-1, Kuhlman Electric Co., Birmingham, Michigan

Electrical progress, under the United Nations Korean Reconstruction Agency, is building a new, stronger Korea. Kuhlman, in serving UNKRA with dependable transformers, is proud to help strengthen the Korean electrical, power and manufacturing industries. World-wide acceptance of proven Kuhlman transformers is another assurance of your complete satisfaction with any Kuhlman product.

KUHLMAN
ELECTRIC COMPANY
GENERAL OFFICES, Birmingham, Michigan

5722 B

EXPORT REPRESENTATIVES: International Standard Electric Corporation • 50 Church Street, 15th Floor • New York 7, New York • **Cable Address:** Microphone, N. Y.



Southern Colorado Power Co. officials inspect their recently installed Quadriphase microwave system designed for use in telemetering, directional comparison relaying, voice communication and supervisory control. The system was engineered by General Electric Communication Products Department and is one of the few of its kind in the nation incorporating all of these functions. R. A. Vostreje, G-E field engineer, demonstrates the system for President David Hyer; George Perry, SC electrical engineer, and W. D. Reinhold of Land-Air Inc., an engineering firm

Photoelectric Switch

(8) *Micro Balancing Inc., 191 Herricks Rd., Garden City Park, New Hyde Park, L. I., N. Y.*

A translucent white cover molded of Tenite butyrate plastic serves a functional purpose on the Lumatrol switch, a photoelectric device now in experimental use by utilities for switching street lights on and off. The translucency of the butyrate permits approaching darkness or daylight to trigger the switch. This method, used to replace time clock switching, cuts down on wiring which ordinarily must be run from the central time switch to the blocks of lights it controls. The new switch may be used on individual lamps or as a control for a string of up to 50 lamps. For individual lamps it is mounted directly atop the lamp reflector. Otherwise it is mounted on a pole adapter to control up to 25 incandescent or 50 mercury-vapor lamps.

Splicing Package

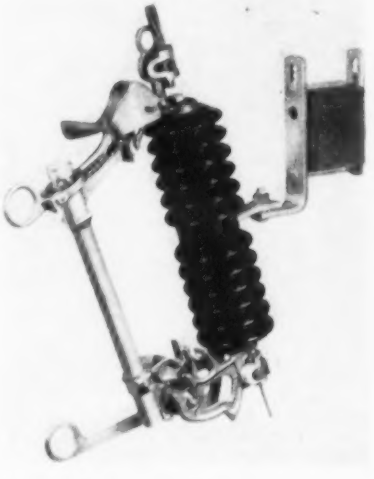
(9) *Thomas & Betts Co., 36 Butler St., Elizabeth, N.J.*

A complete line of service connectors, taps and pin terminals that can be installed with a new pocket-size compression tool has been introduced by this company. The new tool is said to be the smallest compression tool made for line work. In the package are splicers for service connections, angle taps for distribution line connectors and pin terminals for terminating aluminum conductor to copper terminal facilities. The splicers and taps are said to be equally suitable for aluminum and copper conductor.

Three Recorders

(10) *Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.*

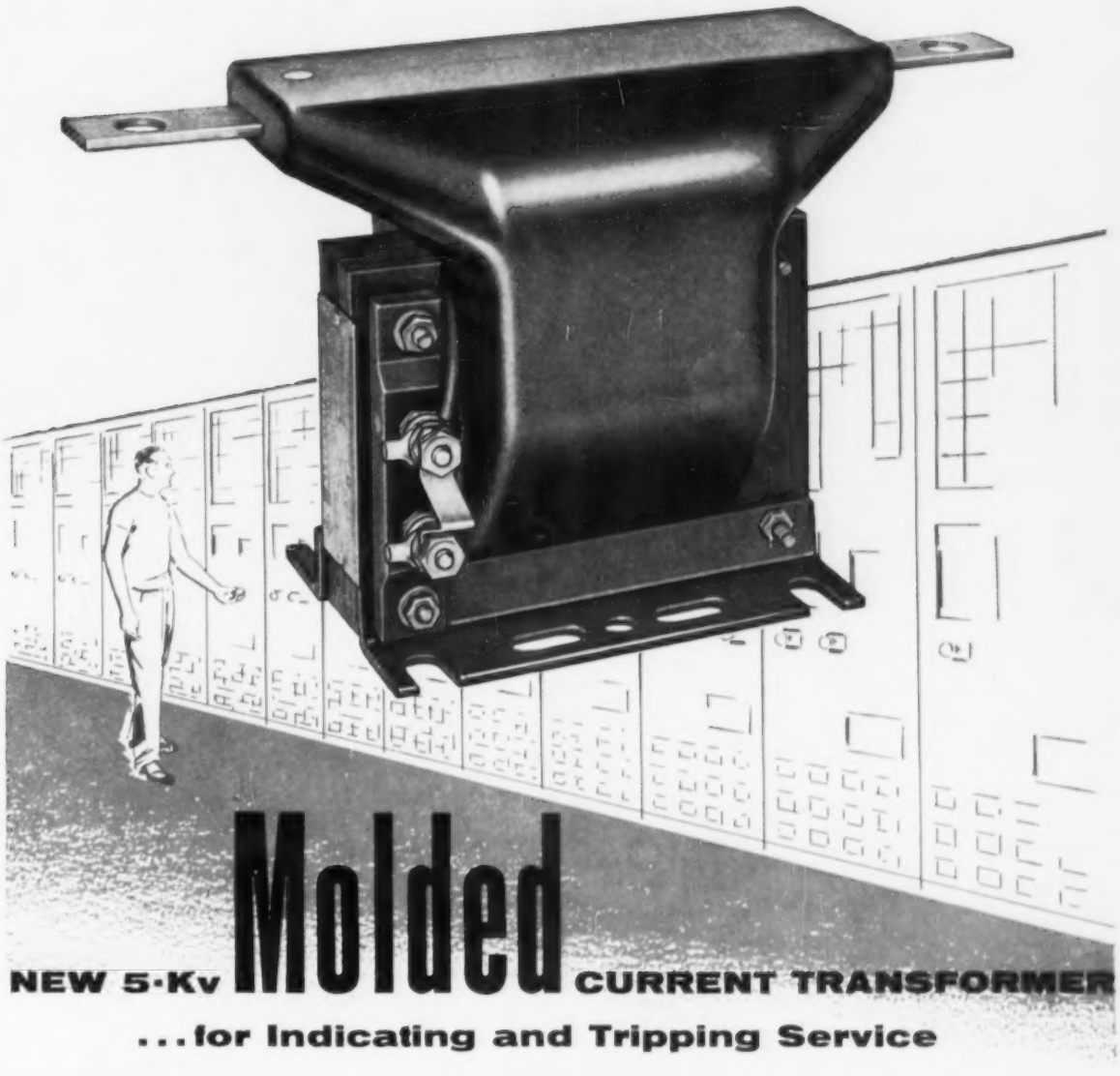
Three new recorders announced by this company are a circular chart potentiometer recorder, a small case multipoint strip chart and a four-pen mechanical recorder. The circular chart type is said to offer the unitization advantages of present strip chart units. The 12-in. circular chart has straight time coordinates to increase readibility. The multipoint strip chart offers up to 12 points on a full size strip chart, but is in a small case. Three of the units mount in the same space as two of most other models. The company's measuring systems are incorporated into a new case design in the four-pen mechanical unit. Temperature measuring systems from −200 F to 1,000 F and pressure measuring systems from −30 in. of vacuum to 7,500 psig are available as standard.



Load Break Cutouts

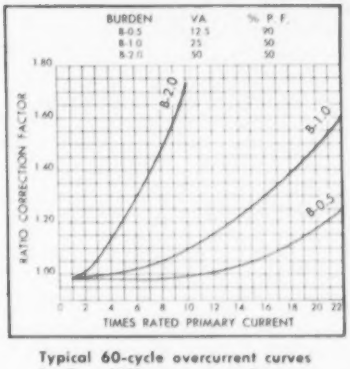
(11) *Southern States Equipment Corp., Hampton, Ga.*

These new load break cutouts are designed for universal button head links up through 100-amp ratings. One model has an expendable disk in the fuse holder cap. Function of the disk is to confine gases on low faults for dependable operation. Disk is expelled on high faults allowing cutout to vent at both ends of the tube for high interrupting capacity. A second model is a single-vented cutout identical to the first except that a solid cap replaces the cap with expendable disk. Available in voltage ratings from 5 through 25 kv.



NEW 5-Kv Molded CURRENT TRANSFORMER

...for Indicating and Tripping Service



Typical 60-cycle overcurrent curves for Type LRM current transformer.

Extends Line of Maintenance-free Epoxy-resin Units

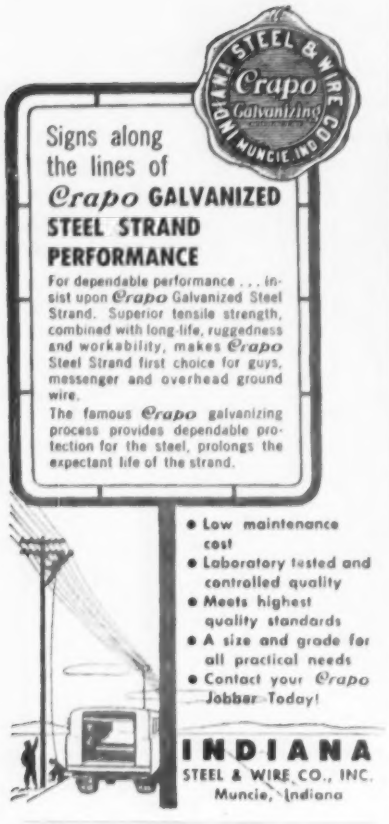
Latest in a growing family of molded units, this Type LRM current transformer rated 5 kv is already a prime favorite with panel and switchgear designers. Molded of epoxy resin, this new transformer is virtually maintenance-free. It has high impact strength . . . resists mechanical forces, moisture and fire. These advantages at no extra cost.

All units are supplied with a short-circuiting strap, removable after installation. Base design permits mounting anywhere—on walls, bars, channels, etc.

Allis-Chalmers instrument transformers are available in the widest possible rating range. Many are molded units. Other epoxy-resin designs are in pilot production. For complete information, see your A-C representative, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5503


INDIANA STEEL & WIRE CO.
Crapo Galvanizing
MUNCIE IND U.S.A.
Signs along the lines of
Crapo GALVANIZED STEEL STRAND PERFORMANCE
For dependable performance . . . insist upon Crapo Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes Crapo Steel Strand first choice for guys, messenger and overhead ground wire.
The famous Crapo galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.
• Low maintenance cost
• Laboratory tested and controlled quality
• Meets highest quality standards
• A size and grade for all practical needs
• Contact your Crapo Jobber Today!
INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

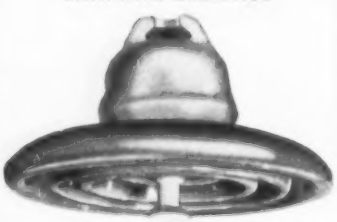
THOMAS

"Chip Proof"

INSULATOR

A new corrugation design positively prevents chipping or breaking of inner petticoats. This protection is assured by eliminating the destructive bumping of caps or clamp fittings against the petticoats, yet gives complete interchangeability with all current designs as required by NEMA Standards.

ELIMINATE BREAKAGE

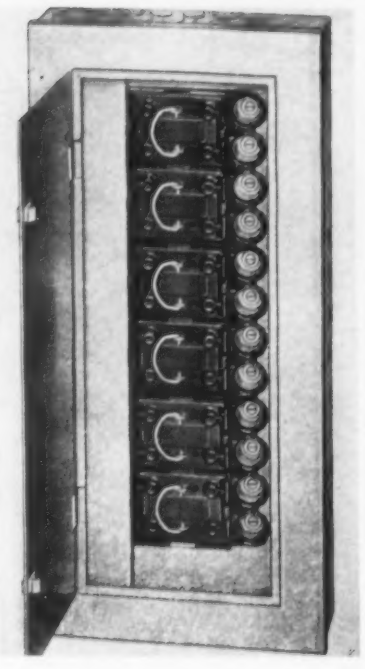


For further information contact:

GEO. E. HONN CO.

phone Sutter 1-7352

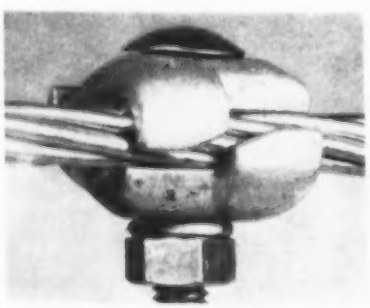
420 Market St. San Francisco, Calif.



Service Equipment

(12) *Wadsworth Electric Mfg. Co. Inc., Covington, Ky.*

Six "Renu-Fuse" pull cover circuits and 12 plug fuse circuits are in this new service equipment. One 60-amp fuse unit controls the 12 plug fuse circuits and subfeed terminals, and another controls the range. The remaining four fuse units are 30-amp and can be used for water heater, dryer, air conditioners and other uses. The line side lugs, including neutral, are designed to take aluminum or copper. Cabinet is available with both flush- and surface-type door trim.



Aluminum Parallel Clamp

(13) *Penn-Union Electric Corp., Erie, Pa.*

This new clamp is hooked on the run by loosening the bolt and placing with a twisting motion. It is cast from high-strength aluminum alloy and is specially treated at the factory to prevent aluminum oxide from reforming. It is filled with Cual-Aid contact compound and packed in individual polyethylene bags. The fingers completely enclose the aluminum or copper conductor from 1/0 ACSR maximum to No. 6 stranded, minimum, over the fitting's entire range.

Work Glove

(14) *Industrial Glove Division, Reigel Textile Corp., Conover, N. C.*

This new work glove is covered with tiny, nonskid plastic dots for easier, more secure gripping and longer wear. The plastic dots are molded into the cloth, and are said to absorb virtually all of the abrasive wear, with little or no wear on the fabric itself.

Thread Protectors

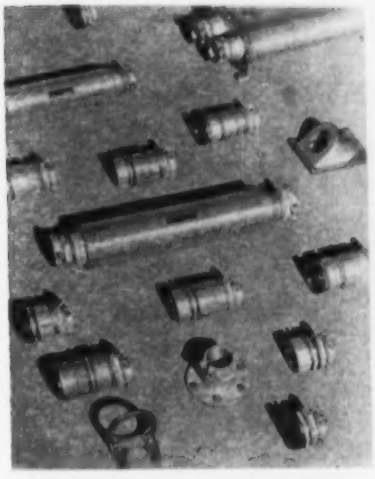
(15) *Rome Cable Corp., Rome, N. Y.*

Protection of rigid conduit threads against abrasive wear and damage during shipment results from the metal protective caps now in use by this company. The caps also serve for identification of conduit size. Two indentations permit the threading on of the caps if they need to be replaced.

General-Purpose Computer

(16) *International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.*

This new computer is a general-purpose model recommended for the solving of individual engineering problems. Numerical data for processing may be entered in the 610 computer either manually from the keyboard or automatically under computer control from a punched paper tape.



Terminating-Splicing Fittings

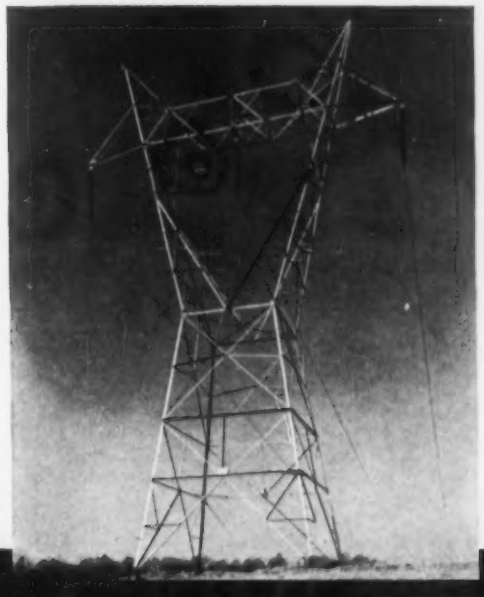
(17) *O.Z. Electrical Mfg. Co. Inc., 262 Bond St., Brooklyn, N. Y.*

A complete line of armored cable terminators, supports and splicing fittings for use with all types of interlocked armor cable has been developed by this manufacturer. The new line of terminators is comprised of 11 different types, including watertight and nonwatertight, upright, horizontal and inverted. Nominal diameters over armor range from .45 in. to 4.28 in.

Lineman's Boot

(18) *Chippewa Shoe Co., Chippewa Falls, Wis.*

A new lineman's boot introduced by this company features "lace-to-toe" design for extra comfort and protection. The design, according to the manufacturer, gives positive support to the ball of the foot, a critical fatigue area for men performing linemen's duties.



ONE COAT OF SUBOX PROTECTS GALVANIZED TOWERS FOR 5 TO 8 YEARS

Indeed, a coat of Subox paint often lasts more than eight years . . . and usually without any chipping, cracking, peeling or blistering.

Subox paints are the only American paints made with lead-suboxide. A colloidal pigment, it assures maximum surface penetration . . . packs to form a dense, impervious coating. Furthermore, being *chemically active*, lead-suboxide *actually works* to strengthen and reinforce the film.

Subox paints have been proved under the severest conditions and are used more widely than any other paints for the protection of galvanized towers. Available in attractive modern colors.

Write for brochure: "Corrosion Control of Electrical Structures and Equipment."

SUBOX PAINTS

Subox Inc.

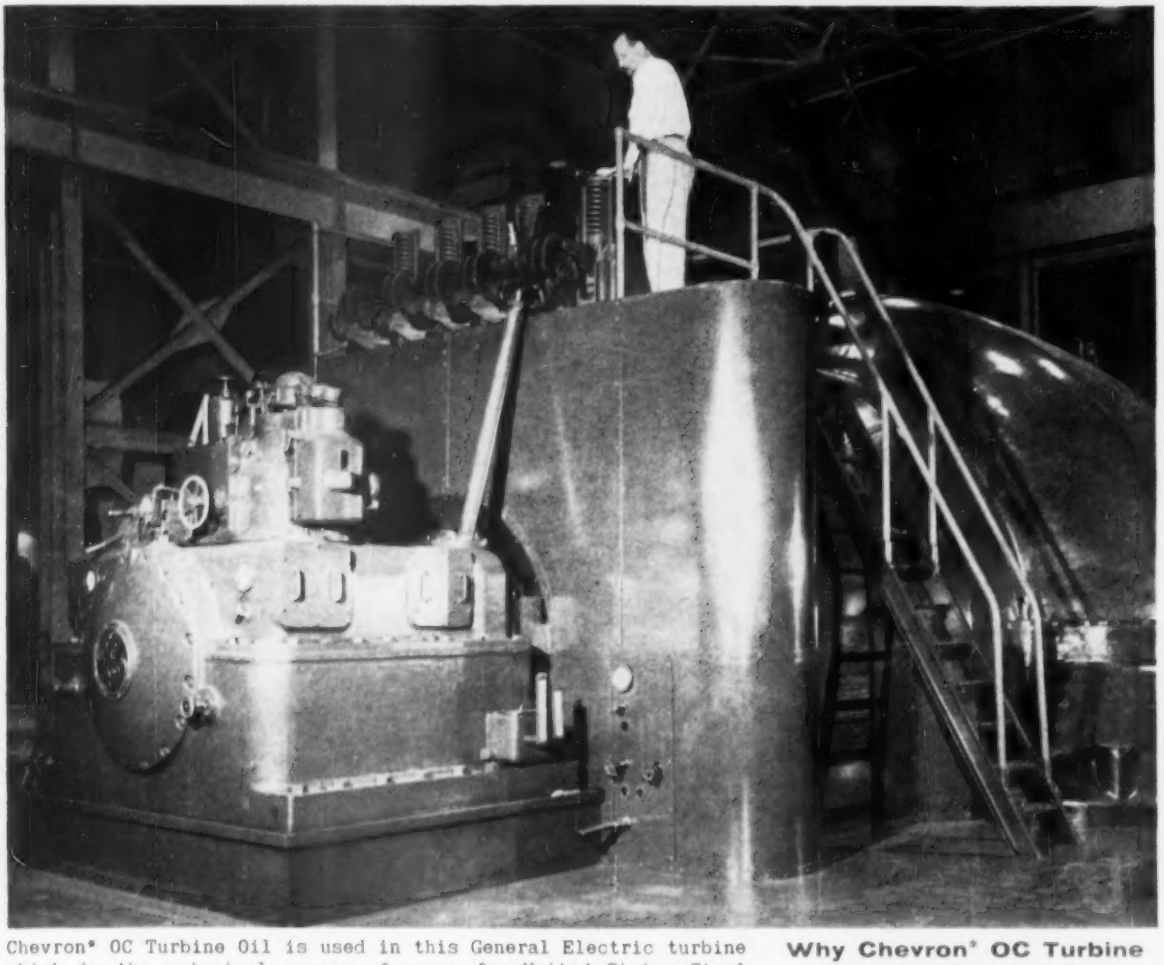
Established 1924
18 Fairmount Plant
Hackensack, N. J.

STANDARD ENGINEER'S FIELD REPORT

LUBRICANT CHEVRON* OC TURBINE OIL

FIRM U.S. STEEL CORP. Geneva, Utah

Oil Neutralization No. only .07 after 100,000 hours



Chevron* OC Turbine Oil is used in this General Electric turbine which is the principal source of power for United States Steel Corporation's mill at Geneva, Utah. After 100,000 hours operation the oil in this 50,000-kw turbine-generator showed a neutralization number of just .07—identical with the number of the original 7,000 gallon charge made in 1943. During regular inspection and servicing periods, the oil was drained, purified, and put back in service. No "sweetening" of the oil, and no other down time was required during the entire 100,000 hour period. Chevron OC Turbine Oil is also used in mill's four 11,350 hp turbo-blowers.

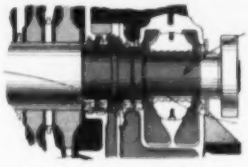
For More Information about Chevron OC Turbine Oils call your Standard Representative, or write 225 Bush Street, San Francisco 20, California.

*The Chevron Brand covers the line of industrial products formerly sold under the Calol name. This is a name change only. The high quality and specifications remain the same.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND DESIGN REG. U.S. PAT. OFF.

Why Chevron* OC Turbine Oil prevents sludging, rusting and wear



- Excellent metal wetting ability keeps oil on bearings and gears under heaviest loads
- Oxidation inhibitor prevents sludge, gum, and lacquer formations
- Corrosion inhibitor stops rusting

STANDARD OIL COMPANY OF CALIFORNIA

BULLETINS ETC.

(19) CONTRACTOR SALES AID — A catalog on electric heating is available from Westinghouse Electric Corp. as a sales aid to electrical contractors. It outlines an organized electrical heating campaign; lists available material. Write to your nearest Westinghouse Apparatus & Supply distributor. Ask for catalog B-4705F.

(20) WIRING DEVICES—A new 76-page catalog illustrating more than 1,500 electrical wiring devices, lamps and specialty products has been issued by Eagle Electric Mfg. Co., 23-10 Bridge Plaza South, Long Island City 1, N.Y.

(21) DISCONNECT—S&C Electric Co.'s tool-operated disconnect is fully described in Bulletin 721, now available to the electric utility industry. Electrical characteristics, insulator characteristics, physical specifications and mounting arrangements are given. Write to the company at 4435 Ravenswood Ave., Chicago 40, Ill.

(22) MAST KITS—Ready for immediate distribution is a new piece of literature on electrical service entrance mast kits. It is offered by Porcelain Products Co., Carey, Ohio. It describes in detail the series 2075 and 2085 kits, as well as special kits available for local needs.

(23) CUTOUTS, SWITCHES—Two bulletins available from Southern States Equipment Corp., Hampton, Ga., describe the company's distribution cutouts and double side-break air switches. Ask for Bulletins 570C and 57RDC.

(24) MOTOR CONTROL—The latest design features in Allis-Chalmers front access, high-voltage starters (type H) for 2,300- to 5,000-v motors which provide maximum accessibility, protection, performance and space economy are given in a new bulletin released by the company. Write to the company at 1125 S. 70th St., Milwaukee 1, Wis. Ask for 14B8507.

(25) WIRE & CABLE—Rome Cable Corp., Rome, N. Y., is offering "Guide to Representative Wire, Cable and Conduit" to the electrical industry. It gives most of the general characteristics of and uses for the firm's products.

(26) SECONDARY TRANSFORMERS—"EEI-NEMA Standards for Secondary Network Transformers" is now available from either organization. Addresses are: Edison Electric Institute, 420 Lexington Ave., New York, N. Y., and National Electrical Manufacturers Assn., 155 E. 44th St., New York, N. Y.

(27) ELECTRICAL CONNECTION—A new 104-page Cadweld catalog is now available from Erico Products Inc., 2070 E. 61st Pl., Cleveland 3, Ohio.

(28) UNIT SUBSTATIONS — A unit substation technical library (GET-2753) comprised of seven individual publications is available from General Electric Co., Schenectady 5, N. Y. The number given here represents the full library.

(29) TURBINE GENERATOR UNITS—Versatility in design and application of General Electric Co. medium capacity steam turbine-generator units is described in GEA-3277D. Write to the company at Schenectady 5, N. Y.

(30) BUS CONDUCTORS—An attractive, fully illustrated technical manual on Kaiser Aluminum bus conductors is available from the company. Write to Technical Publications, Kaiser Aluminum & Chemical Sales Inc., 919 N. Michigan Ave., Chicago 11, Ill.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after February 1

Please send me, without obligation, the new product information or catalogs

If described in Product News, circle item number

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

If described in advertising, fill in page number

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

GEDNEY'S RIGHT THERE IN YOUR CORNER

helping save time . . . hold down costs

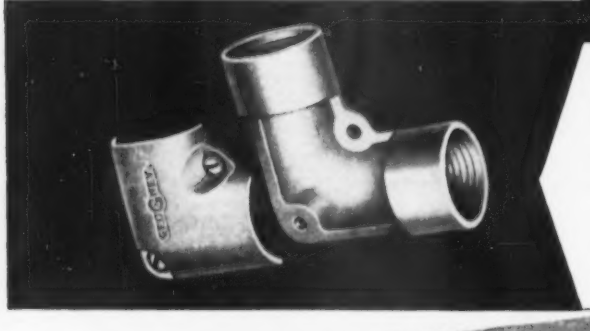
CORNER FITTINGS? Well, here are three that have proved immensely popular for the simple reason they're easiest to install—save time and labor that really counts up. Like the rest of the full Gedney line they're made of unbreakable malleable iron...accurately machined and threaded... individually inspected. Order Gedney—always—for lowest installed costs!

90° CORNER ELLS

Fitted with gasketed cover. Both ends female. Made of malleable iron, cadmium plated. Available in a full range of sizes from ½" to 2".

90° CORNER ADAPTERS

Fitted with gasketed cover. One end male, one end female. Made of malleable iron, cadmium plated. Your choice of sizes from ½" to 2".



CORNER PULL-IN CONDUIT ELLS

Today's top specification for space-saving, machine wiring, easy wire pulling. Malleable iron, cadmium plated. Sizes run from ½" to 2".

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

DECEMBER 1957

ELECTRICAL WEST SALES GUIDE

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

WWP tipsters build profits

Washington Water Power's tip campaign is going great guns. (See p 112.) A high percentage of employees are turning in sales tips and winning prizes. As of the eighth week, 2,285 tips had been turned over to sales departments for action and nearly 40% resulted in sales.

Big plans for Electrical Week

Portland General Electric is looking ahead to National Electrical Week in February 1958, when it will put on a big promotion. Plans now jelling include projects for high school students, on the theme "Electricity at Work," a contest among dealers and plumbers, and a raffle with a grand prize of an all-electric kitchen.

More N. E. W. plans

In northern California the Electrical Week committee, under chairmanship of Frank Falge, has announced that the big feature will be a repeat of the prize drawing, which was so successful last year. Electrical appliances worth $20,000 will be offered to electric customers of PG and E in this event, which will be headed by Vern Brown of Graybar. Vice-chairmen of the week are Bert Reynolds, NCEB manager, and Jack Ross, PG and E manager of residential sales.

88 per cent are dryer prospects

More than 2,000 electric appliance dealers turned out for the territorial meeting conducted by Southern California Edison, kicking off the winter campaign to promote the sale of electric dryers. Edison's general sales manager, Harold Moore, told the dealers that clothes dryers have achieved a 12% market saturation in the 10 years since their introduction, leaving the other 88% of the nation's families as excellent prospects. Helping Moore outline the campaign were G. R. Haysel, advertising manager for Edison, and Jack Meserve, manager of residential sales.

Another first

San Diego Bureau of Home Appliances has another first to its credit—an industry-wide course in kitchen modernization for sales people. "How to increase your profits from kitchen sales" was discussed at five 1½-hour sessions between Oct. 24 and Nov. 21. Twenty-four people with backgrounds from purely technical to purely sales took the course, which was in response to dealer request. Sponsors were the bureau sales

training committee and the newly organized kitchen modernization committee. Those who planned it are Carleton Barker and Jim Hardin of San Diego Gas & Electric and Norman Anderson and Bill Durning of the sales training committee.

More electric heat for Wyoming

Walter Hudson, chairman of the Wyoming Public Service Commission, has predicted that future construction of power facilities in the state would lead to more electrically heated homes. Hudson made the comment after Wheatland Rural Electrification Assn. asked the PSC to authorize special rates to permit heating of homes with electricity. The utility proposed to sell all electricity over 1,000 kwh at 1¢ per kwh. It now runs about 3¢. Lower Valley Power & Light Co. in Teton County established special rates for electric heating of homes several years ago.

Sheer look—1958 version

Featuring the sheer look with a new "feminine touch," Frigidaire's 1958 line—Golden Anniversary models commemorating GM's 50th birthday—was introduced in the West last month. The emphasis is still on the built-in look in free-standing appliances but more attention has been given to slim lines and uncluttered styling. Two new colors—turquoise and yellow—have been added to last year's charcoal, grey, pink and white. Refinements have been made in the manufacturer's "flowing cold" refrigeration, an ice ejector and bin have been added, a new "pantry door" has removable aluminum shelf fronts, the recessed door has a smooth unbroken trim and a new hinge arrangement with two-way latch. Interiors are white with turquoise and dark green trim. Ranges feature a spatter-free broiler grill. This grill has a high-walled pan with grid that fits into a shallow pan, holding a small amount of water to keep fat fluid. A control provides for rare, medium or well-done meat without changing the broiler pan position.

New features on '58 line

Philco is introducing Tri-Frigeration in its 1958 Super Marketer refrigerator line, which comes in 12-, 14- and 16-cu-ft, two-door, automatic boxes from $549.95 to $649.95 retail. Shown in northern California by California Electric Supply late last month, the new refrigerator and range lines also include conventional refrigerators from 8.5 to 11 cu ft, retailing from $189.95 to $289.95, and twin-system automatic defrost models from 11 to 13 cu ft, $339.95 to $489.95. Certain models feature a fold-away shelf, roll-out adjustable shelves, a 33° meat storage drawer, a device that operates to spray leafy vegetables each time the door is opened, ice ejector and storage bin. Ranges, available from $196.95 to $329.95, with a rotisserie optional at $20 extra, have such features as deep, no-spill pans

on surface units, push-button controls, roast meter, broil-under-glass oven feature.

Northwest showing

G-E showed its 1958 line in Medford, Eugene, Portland and Pendleton the middle of November, according to E. F. Graff, manager of the appliance and TV department of G-E Supply Co., Portland. Graff reports losing one of his key salesmen. R. C. "Bob" Padget has been promoted to manage the appliance and TV department at the Albuquerque branch.

Fiber glass cabinet

Packard-Bell is introducing a line of preformed fiber glass portable TVs. Kenneth R. Johnson, the firm's vice-president in charge of home products, described the 17-in. model as dent-proof and of high tensile starength.

Consolidated

Hotpoint Appliance Sales Co. has shifted its distribution setup in the Northwest by consolidating its Portland and Seattle branches with district headquarters in Seattle. Phil Drieci is district manager; Lou Edeli, district operating manager—both from the former Portland branch. Territory includes Oregon, Washington, northern Idaho, Montana, Wyoming and Alaska. Local houses are maintained at Seattle, Spokane, Butte, Portland and Eugene. The 1958 line will be previewed in December.

Appointments

Charles P. Culbert, president of Charles P. Culbert Organization and former vice-president of Sues, Young & Brown Inc., has been appointed regional manager for Capehart in the three-state area of California, Nevada and Arizona. . . . Warren Hawkins has joined Thermador Electrical Mfg. Co. in Los Angeles as district sales engineer for the San Fernando Valley and Lancaster areas. Hawkins was most recently adequate wiring adviser for So. Calif. Edison.

About people

Frank Reis, since January acting sales manager for Pacific Power & Light Co., has been made general sales manager. . . At Sacramento Municipal Utility District Thomas H. Shea has succeeded Ray Dunshee, who retired recently as commercial manager. Shea was formerly assistant general auditor. . . William L. Constance is Pacific Coast manager of the Westinghouse Air Conditioning Division, succeeding the late Frank W. Jordan. His headquarters are at Los Angeles.

Notes on the trade

Joe Onofrio Music Co. of Denver has been made Rocky Mountain area distributor for Grundig-Majestic radios and tape recorders. Mickey Sherman is sales manager. . . Neal Schuman is now San Francisco regional manager for Eureka Division, succeeding Bob Boynton, who retired after 40 years in the organization. Headquarters are being moved from Los Angeles to San Francisco.

Frank Falge's monthly progress report on

LIVE BETTER . . . *Electrically*

First LBE Medallion Presented

Idaho Power Co. was the first utility in the United States to present a Live Better...Electrically Medallion, a gold one, to Ralph R. Sherman, builder of the Boise Electri-Living Home. This all-electric home features engineered electric heating by Solar Electric Heat Co. of Boise with individualized embedded heating coils in ceilings. J. T. Kimball, vice-president and general manager of Idaho Power Co., made the award on Oct. 16.

Who buys electric heat?

Washington Water Power Co.'s "Hotter Than Blue Blazes" campaign is off to a fast start. Quotas for the year were exceeded in the early summer and consequently were doubled. WWP found out: 31% of the buyers of electric heat are in new homes; 24% in homes 10 years old or less; 43% in homes 20 years old or less; 26% in homes more than 20 years old; 11.99 kw was average connected load; 880 sq ft was average home size. Approximately 8,000 homes in the Spokane area are now enjoying electric heating.

Electrical furniture now available

"A new furniture line that you plug into the wall" is a feature story in Modern Living of the San Francisco Examiner of Nov. 10. Swiss-born Paul Zell has "push button" furniture including breakfast tables that expand electrically, bedside tables with fingertip control for draperies, lighting, radio and TV. Drawers light up when opened and other lighting innovations are featured. Low-voltage wiring is used for control.

Be healthier electrically

In the health category, living better electrically has by no means been overlooked. Numerous ads feature: Cyclo-Massage sets, lounges and sofas by Niagara; Viveration chair lounges by Contour Chair Lounge; reducing aids by Relax-A-Cizer; Reduc-O-Pads by Vibra Mfg. Co.; reducing lounges by Stauffer; reducing bath therapy by Jacuzzi; foot vibrators, sun lamps, heat lamps, heating pads, etc.

A note for women

It's reported that one man in every three now enjoys the comfort of electric shaving, but only one in 20 women do. Someone opined that perhaps men have less wrinkles than women do because they shave electrically. Women prospects, please note.

HERE'S HOW DELTA-STAR DISTRIBUTION TRANSFORMERS* offer lighter weight, easier maintenance, and improved core

BUSHINGS

Double-keyed—connector to porcelain—porcelain to tank. Assures positive lock against rotation.

COVER

Assures positive seal—and natural shedding of water. One-piece non-corrosive clamping band with re-usable nitrile rubber gasket.

TERMINALS

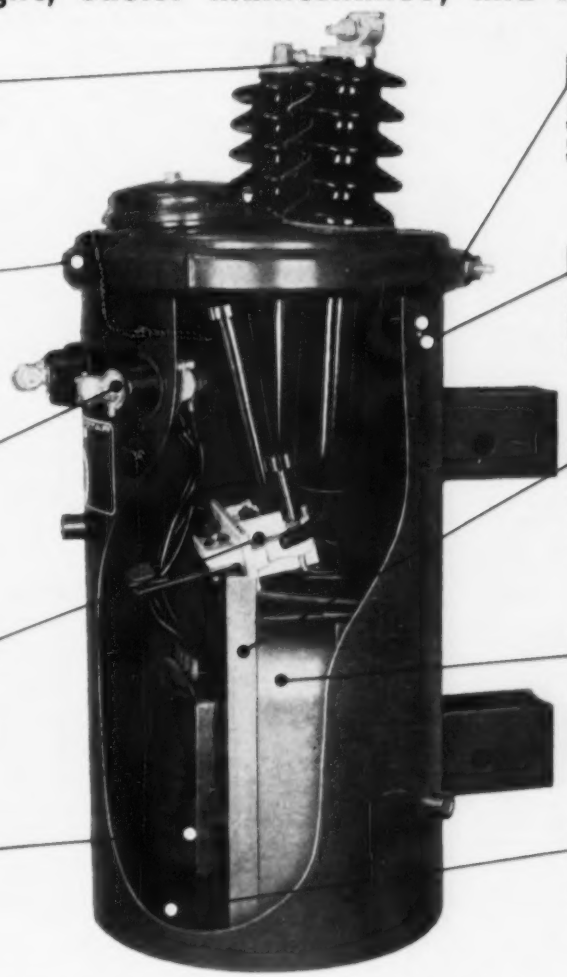
Tin-plated bronze alloy. Spring loaded to accommodate aluminum or copper conductors.

TAP CHANGER

Positively positioned. Liberal voltage-creepage distance. Handle grip above oil. Shorting bar under spring tension.

COIL

Wound with liberal insulation. Heavy Formvar wire. Ducts provide maximum, uniform cooling.



TANK

Design minimizes number of external parts. Pressure-tested for perfect sealing. Reinforced bottom edge.

FINISH

Provides maximum corrosion-protection. Special metal preparation prior to alkyd painting. All primer and finish coats baked.

CORE-COIL ASSEMBLY

Will not shift under severest handling conditions. Securely anchored to tank wall. Positively braced against short circuits.

PORTER CORE

Grain-oriented, cold-rolled silicon steel. Assures low losses, smaller tank, minimum weight.

INHIBITED OIL

Gives extended life with better insulating characteristics. Specially processed immediately before filling.

With single phase ratings from 3kva to 167kva, in standard voltages through 15,000 volts, this complete line of Delta-Star Transformers embodies the latest developments in transformer design . . . a pole type built to fully meet NEMA standards.

***Send for 16-page illustrated catalog.* Write to H. K. Porter Company, Inc., Delta-Star Electric Division, 17th and Cambria Streets, Philadelphia 32, Pa.**

***PATENTS APPLIED FOR**

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

If you want to be sure *install Tiger Brand*

Cable is pulled through the racks. Pulleys ease it through at each turn.

SINCE we've been making electrical cable at American Steel & Wire since 1891, customers often ask us how they can best plan for *future* wiring needs. They've seen the shocking cost of plant modernization programs in buildings that were not designed with foresight.

Electrically speaking, you're going to need a *flexible* wiring system, one that can be enlarged or revamped with ease. To lots of designers today, that means a feeder system that is *not* permanently sealed in rigid conduit, frequently buried under tons of concrete and, in case of damage, frequently unrepairable. All of these problems are solved when you install flexible Armorlokt in an open-rack system.

Initial installation is not difficult. Extra feeders can be added easily at any time. Special feature: Splices can be made *anywhere* along the cable's length. The pictures on these pages show how adaptable and flexible such a wiring system can be.

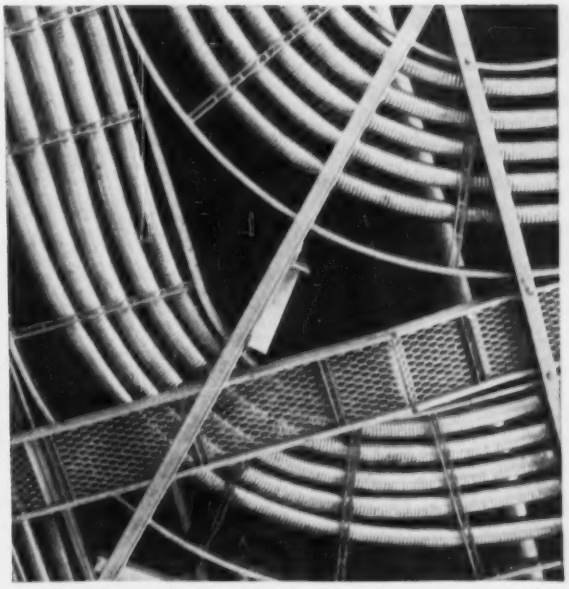
Tiger Brand Armorlokt is made in a complete range of sizes and constructions. Ask your AS&W salesman.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

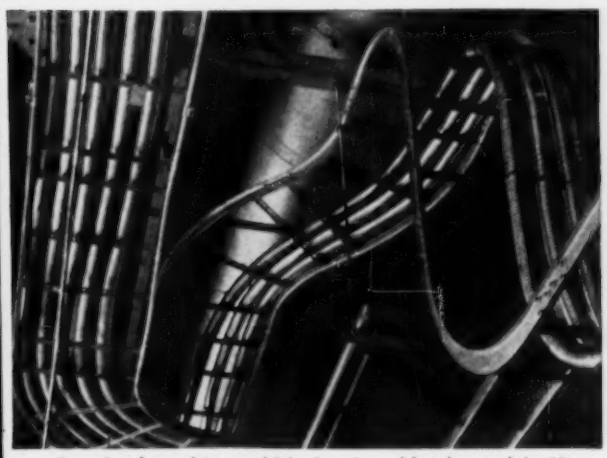
Winch on truck does the pulling. Crew members talk to each other with telephones.

# of adequate wiring in 1977, *Armorlokt now!*

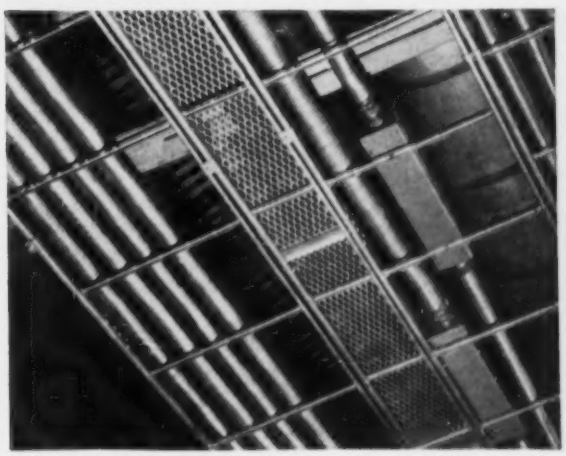
Armorlokt terminates easily. Flexibility of the cable eliminates fussy joint work.



Small radius or large radius curves are easily handled. Space is left for future cable.



Imagine how this would look using old-style conduit. Now it's neat and accessible.



Splices can be made anywhere, an important feature if cable is damaged in service.

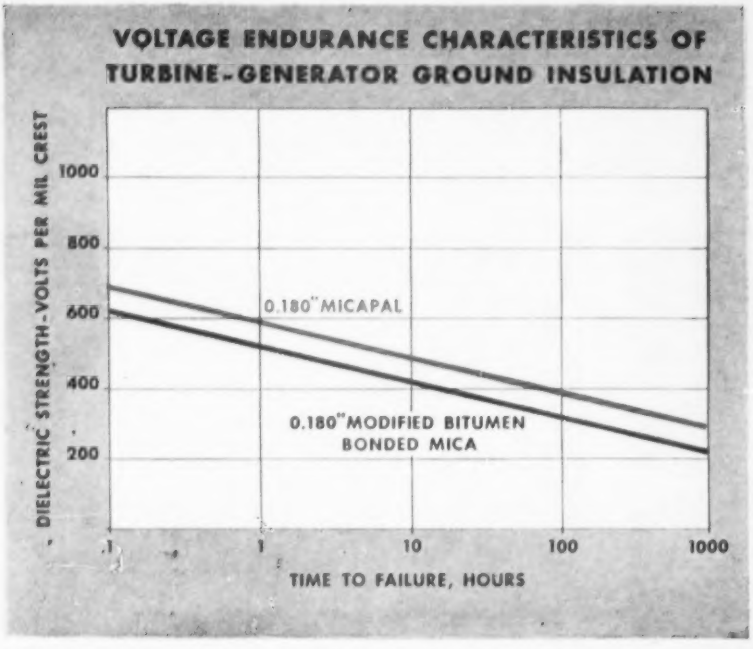
USS TIGER BRAND ELECTRICAL WIRE & CABLE

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

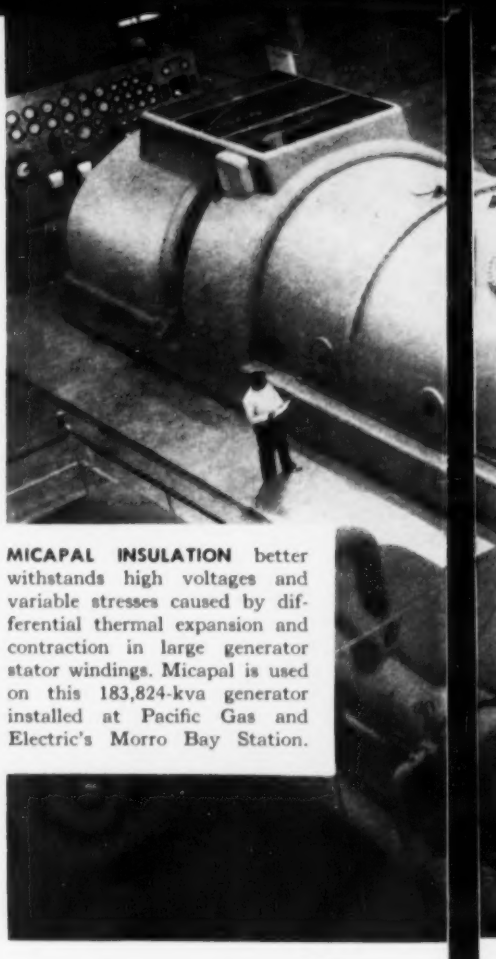
- ASBESTOS WIRE AND CABLE
- MOLD CURED PORTABLE CORD
- SHOVEL & DREDGE CABLE
- PAPER & LEAD CABLE
- VARNISHED CAMBRIC CABLE
- INTERLOCKED ARMOR CABLE
- SPECIAL PURPOSE WIRE & CABLE
- AERIAL, UNDERGROUND AND SUBMARINE CABLE

USS

UNITED STATES STEEL

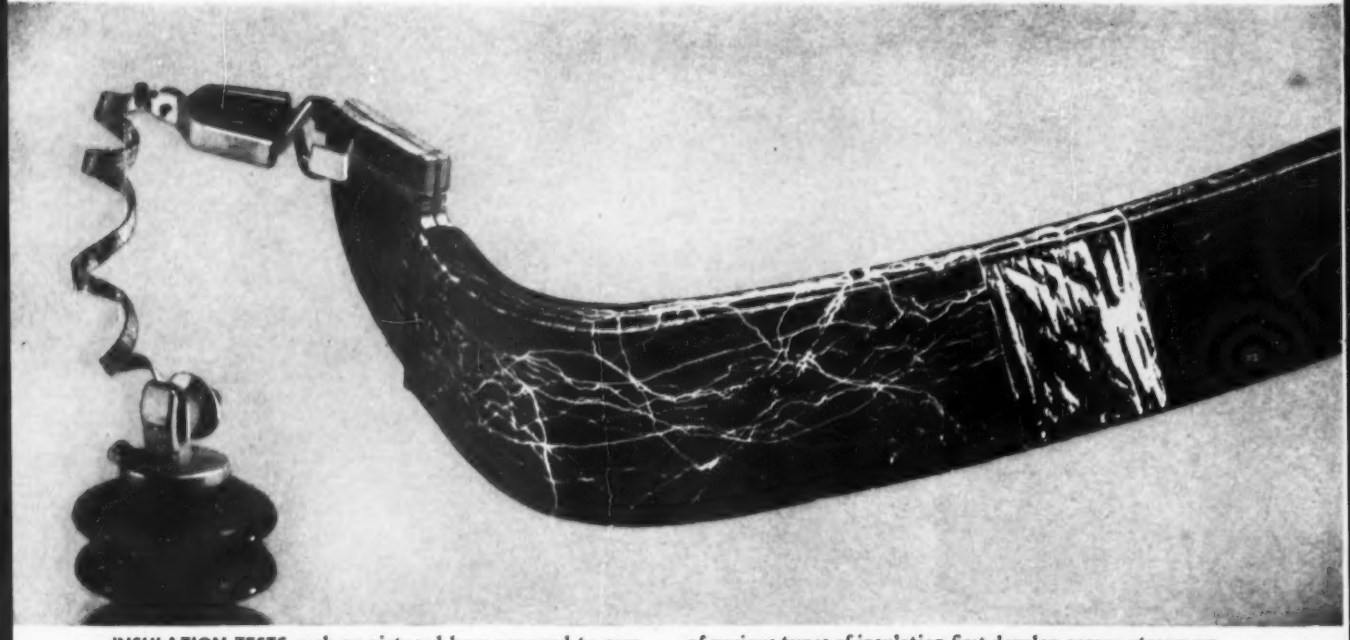


SIGNIFICANT IMPROVEMENT is noted in voltage endurance obtained for any duration of voltage application on Micapal compared to presently accepted generator insulating material. This improved voltage endurance increases long-term turbine-generator availability.

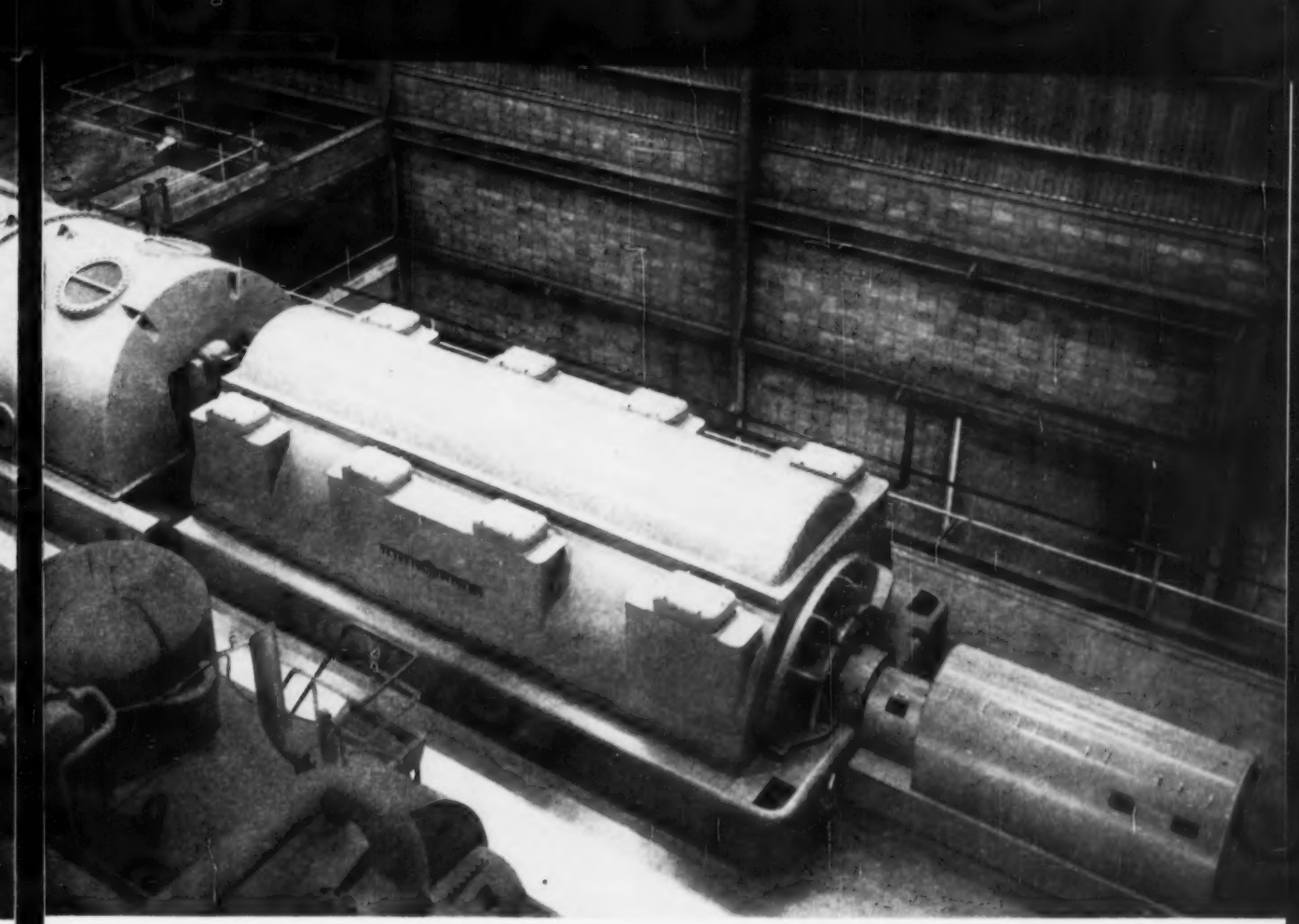


MICAPAL INSULATION better withstands high voltages and variable stresses caused by differential thermal expansion and contraction in large generator stator windings. Micapal is used on this 183,824-kva generator installed at Pacific Gas and Electric's Morro Bay Station.

How General Electric Micapal



INSULATION TESTS such as pictured here are used to compare the dielectric breakdown of different insulations. Forced to carry voltages far above their rating, test bars of various types of insulation first develop corona streamers, then finally fail, enabling engineers to measure the insulation's actual voltage endurance.



insulation extends generator life

IMPROVED INSULATION BETTER WITHSTANDS HIGH VOLTAGES, VARIABLE STRESSES

Now, after extensive research and four years of operating experience, General Electric announces the extended application of Micapal insulation for high-voltage stator windings. A major advance in providing still longer, more reliable operation, this mica-based insulation offers these distinct advantages:

Greater Tensile Strength. Micapal incorporates mica mat and some mica flake bonded with a duplex thermosetting resin. Mica mat is finely divided, reconstituted mica formed into sheets. The thermosetting binder, combined with uniform mica structure, makes Micapal much tougher at operating temperatures than earlier insulations.

Greater Dimensional Stability. Micapal is molded to the precise shape of generator armature bars. Because of thermosetting qualities, the insulation won't flow or lose shape. It possesses great mechanical strength over the full range of operating temperatures.

Improved Thermal Conductivity. Micapal removes heat from electrical conductors more easily. The result is that for a given current and same insulation thickness, the armature bar runs cooler.

Improved Dielectric Breakdown Strength. The voltage endurance characteristics shown on the chart, above, illustrate how Micapal insulation withstands a much higher voltage than other mica insulation for any given period of time. The impulse puncture structure of Micapal has been shown by laboratory tests to be higher by an even greater factor.

Improved Micapal insulation is just another example of General Electric steam turbine-generator progress in meeting tomorrow's power demands. For more information on new generator developments, write Large Steam Turbine-Generator Department, General Electric Company, Schenectady 5, New York.

254-41

Progress Is Our Most Important Product

GENERAL ELECTRIC

It takes **KEARNEY QUALITY** in fuse links to give you positive protection... close coordination

FUSE LINKS FIELD-TESTED

Here at KEARNEY's Substation Laboratory of 150,000 KVA Transformer capacity—with a back up power of 445,000 KVA—all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are not theoretical calculations... but actual, proved performance ratings.

controlled manufacture, rigorous testing provide maximum service continuity

Quality control in KEARNEY Fuse Links starts with design... and continues through careful selection of materials, precision parts manufacture, expert assembly and strictest inspection and testing. The end result is dependable protection... *uniformity* that guarantees all Fuse Links of the same rating will perform exactly alike.

ALL KEARNEY Fuse Links feature low temperature operation. Pure tin elements or low melting point solder, selected for proper strength and melting temperature for each current rating, keep temperatures inside the cutout tube well below charring point. This provides accurate, positive arc clearance even after long periods of overload.

Take care of your requirements in Specialized and Standard Fuse Links with KEARNEY... best you can buy! Contact your KEARNEY Representative.

JAMES R. KEARNEY CORPORATION
General Offices: 4236 Clayton Ave., St. Louis 10, Mo.

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix.

379W

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

JAMES R. KEARNEY

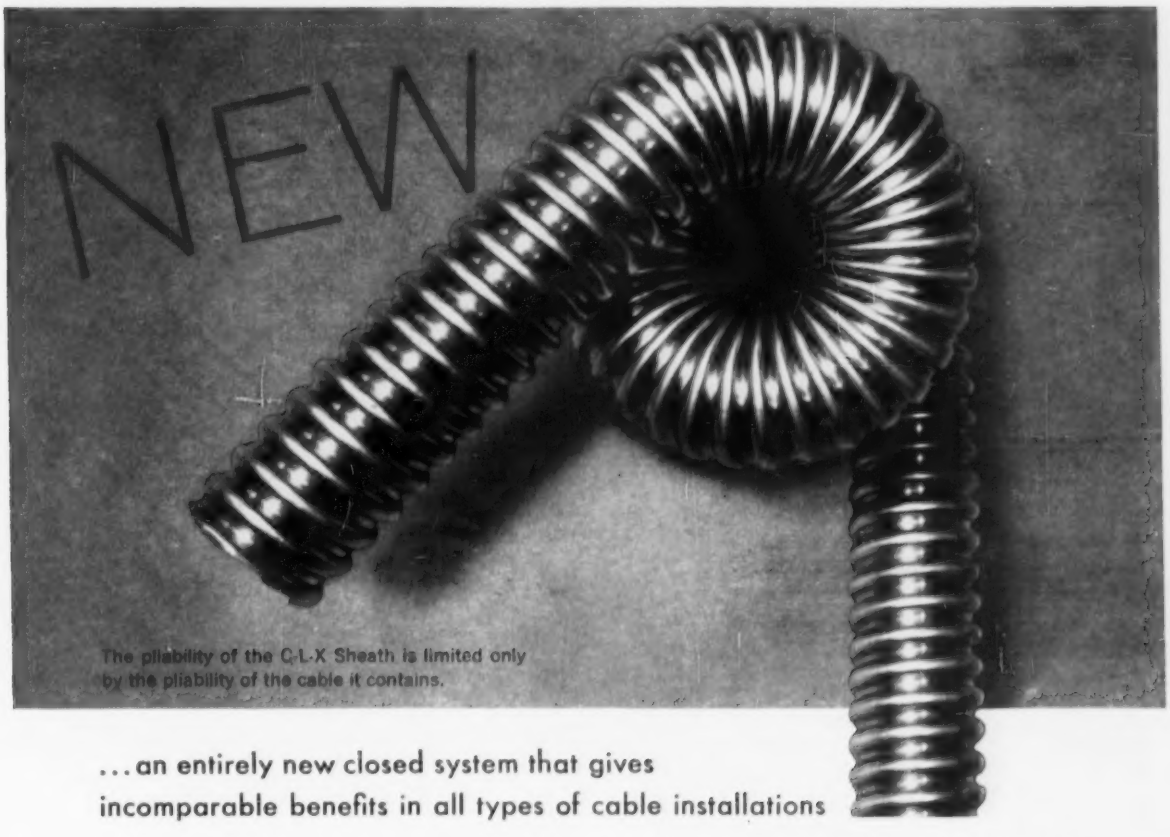
The Mark of Quality

KEARNEY PRODUCTS

Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA — GUELPH, ONTARIO, CANADA

Simplex

ANNOUNCES the C-L-X* Sheath



...an entirely new closed system that gives incomparable benefits in all types of cable installations

Simplex C-L-X is a Continuous Lightweight eXterior metallic sheath that is impervious to gases, chemicals and water. Its unique construction gives it a combination of properties that is unmatched by any cable system now manufactured in the United States.

C-L-X provides a completely sealed conduit — with "built-in" cable. C-L-X combines all the advantages of lead sheathed and interlocked armored cables. In addition, it has its own intrinsic qualities of great strength with extremely light weight. It is suitable for installation in trays or by clamps. C-L-X can be used aerially or buried directly in the ground. Its pliability permits ease of installation.

For more than a decade, this type of cable protection has given exceptional service in European installations. *Now, Simplex engineering has adapted C-L-X so that its scope of industrial applications is practically unlimited for modern American installations.* It is unequalled in situations where impermeability and durability are important.

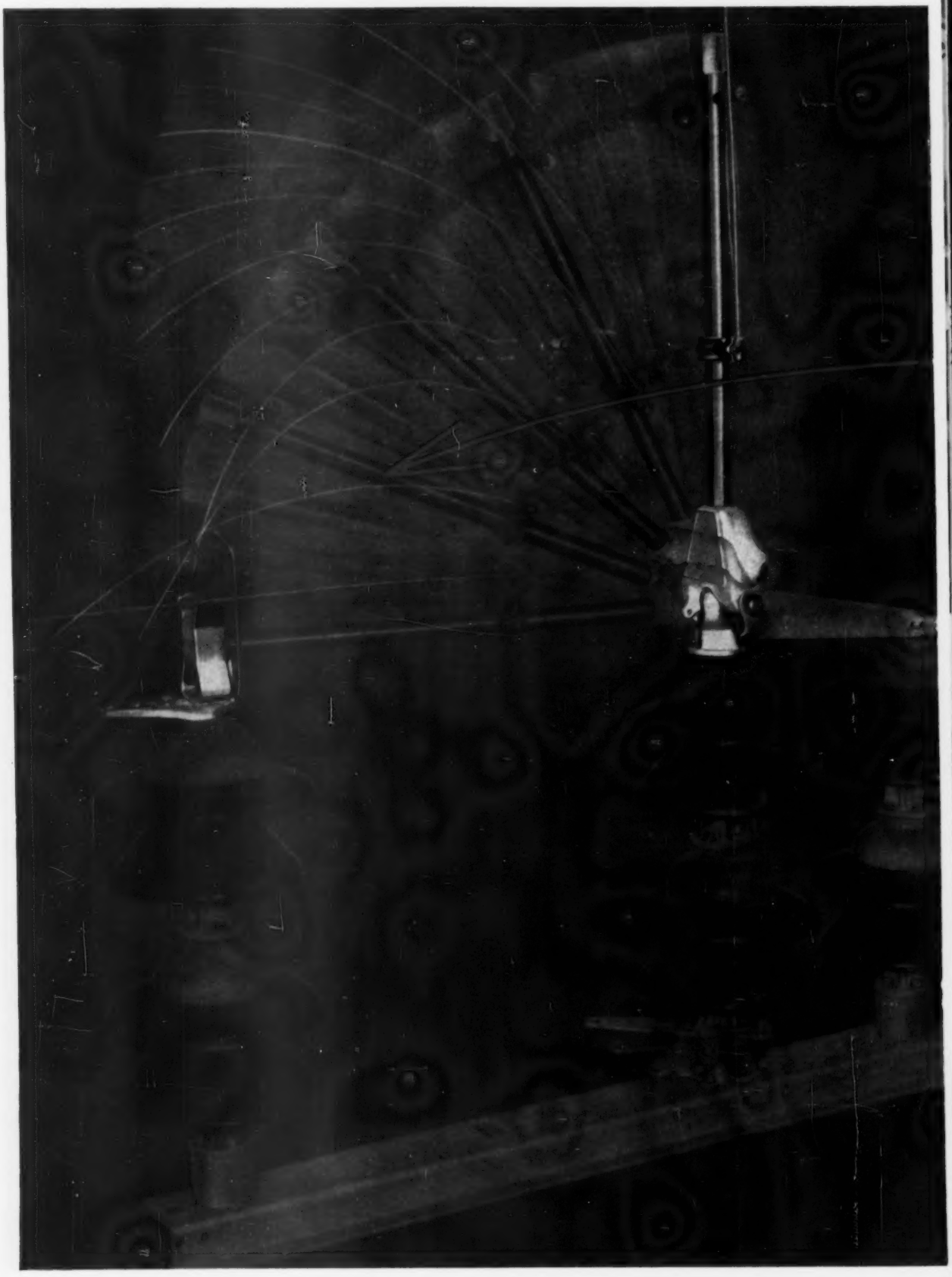
Like all Simplex products, C-L-X is engineered for lasting quality and, therefore, *dependability*. Write for specific product data.

*(Continuous Lightweight eXterior, pronounced "Sealex")

LIVE BETTER ELECTRICALLY

Simplex WIRE & CABLE COMPANY
79 SIDNEY STREET, CAMBRIDGE 39, MASS.

"the American manufacturers of transoceanic telephone cables"



A quarter century of interrupter switch research . . .

produces another tool to solve your power switching problems

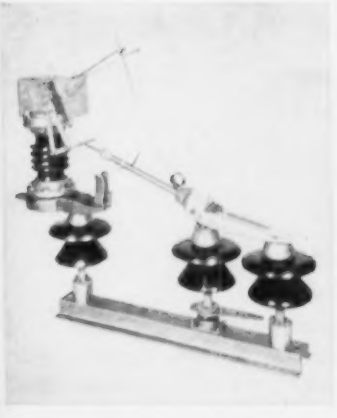
Basic research in the theories of arc interruption has been carried on at the Westinghouse High Power Lab since the early 30's to establish principles useful in developing our modern disconnect switches.

Latest in the line of Westinghouse interrupting switches is the quick-break arcing horn . . . to quickly and safely interrupt small loads, magnetizing or charging currents. The line is available for adding to the Type V or RL in ratings from 7.5 to 69 kv. (Unit at left is rating 69 kv.) With the positive snap action of the quick-break arcing horn, to prevent arcing, primary circuits can be safely interrupted under load without endangering personnel or equipment.

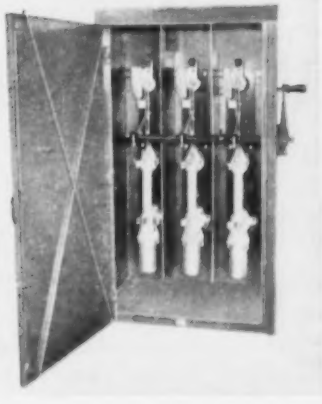
For complete details about the best air break switch to solve your circuit interruption problem, call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

J-60939

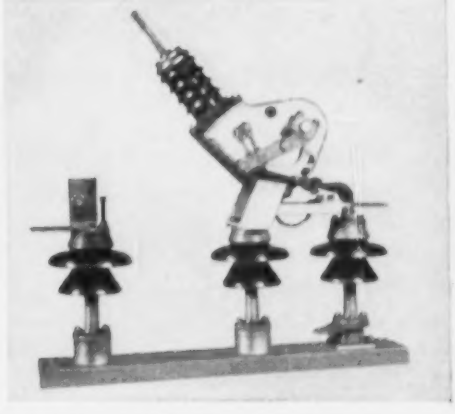
YOU CAN BE SURE...IF IT'S Westinghouse



Continuing research and testing at Westinghouse has contributed much to the art of arc interruption. The VLB switch developed in 1951 introduced SF_6 to extend load break capacities to 161 kv.



Earlier research, in 1940, resulted in the design of the LCB switch with boric acid fuses utilizing the De-ion® principle . . . having ratings from 5 through 15 kv on indoor applications.

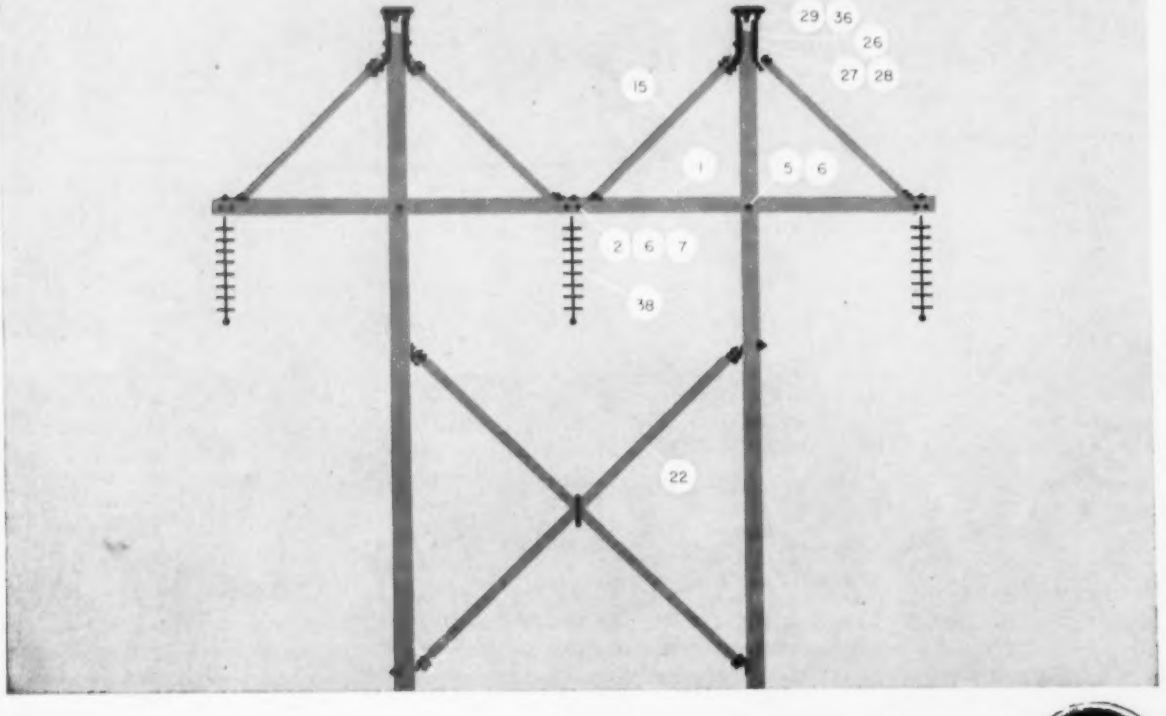


An early model air break switch Westinghouse was working with in the 1930's to improve the arc-extinguishing techniques known at the time . . . one result: high pressure contact jaws.

TANGENT W/BRACES NO. 702

H-FRAME STRUCTURE, DOUBLE PLANK CROSSARMS WITH METAL SPACERS, POLE TOP STATIC WIRE SUPPORTS, AND WOOD CROSS BRACES DESIGNED FOR 69 TO 154 KV CONSTRUCTION

DRG. REF. #	QUANTITY	DESCRIPTION	DRG. REF. #	QUANTITY	DESCRIPTION
792	2	Pole	15	4	Vee brace 3⅜" x 4⅜" cross section
1	2	Crossarm	22	1 set	Cross brace w/fittings, clamp, ⅞" pole bolts and curved washers
2	3	Steel spacer fitting w/mounting bolts	26	2	Static wire support
5	2	Stud bolt ⅞" w/washer nuts	27	4	Machine bolt ¾"
6	8	MF locknut ⅞"	28	4	MF locknut ¾"
7	1	Bent stud bolt ⅞" x 8" w/2 sq. nuts	29	2	Clevis
			36	2	Suspension clamp for static wire
7	2	Bent bolt ⅞" x 5½" w/sq. nut	38	As required	Suspension insulators and fittings



SIMPLIFY YOUR POLE LINE PROJECTS . . .

ORDER via Graybar

The combination of top quality materials and specialized Graybar service can make a substantial contribution to simplifying your pole line projects. For example, take the structure illustrated here.

These complete cross-arm units are fabricated and fitted with hardware according to *your* specifications. Every pre-bored member fits perfectly. You reduce time consumed and cost of field assembly. You can plan on a far more smoother, efficient operation and completing the job on schedule.

Need assistance in solving tough or unusual problems? In addition to our regular service, Graybar Outside Construction specialists and field representatives are always ready to share with you their specialized knowledge.

For assistance, advice, complete quotations and the quality materials that assure uninterrupted service to your customers, make your next transmission or pole line order read "via Graybar".

761-812

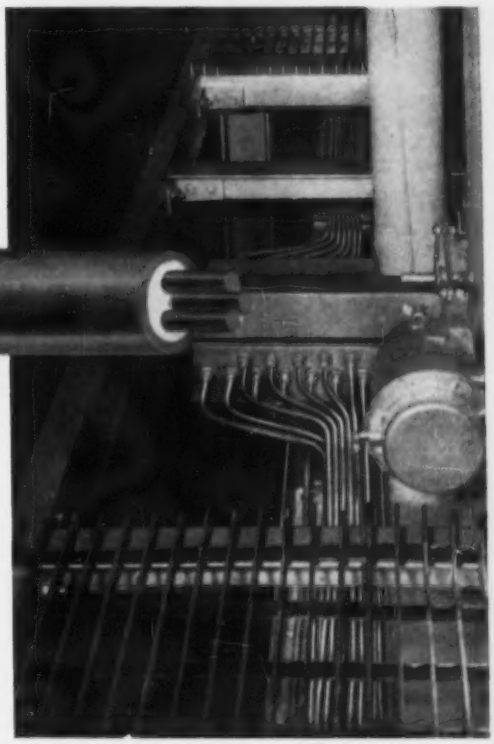
GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

Call Graybar first for... Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

SAFETY m.i. CABLE

the answer to industrial power wiring...



- SPACE SAVING
- Time saving
- Permanent
- INSTALLED EASILY
- Fast power wiring to cut down-time

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.

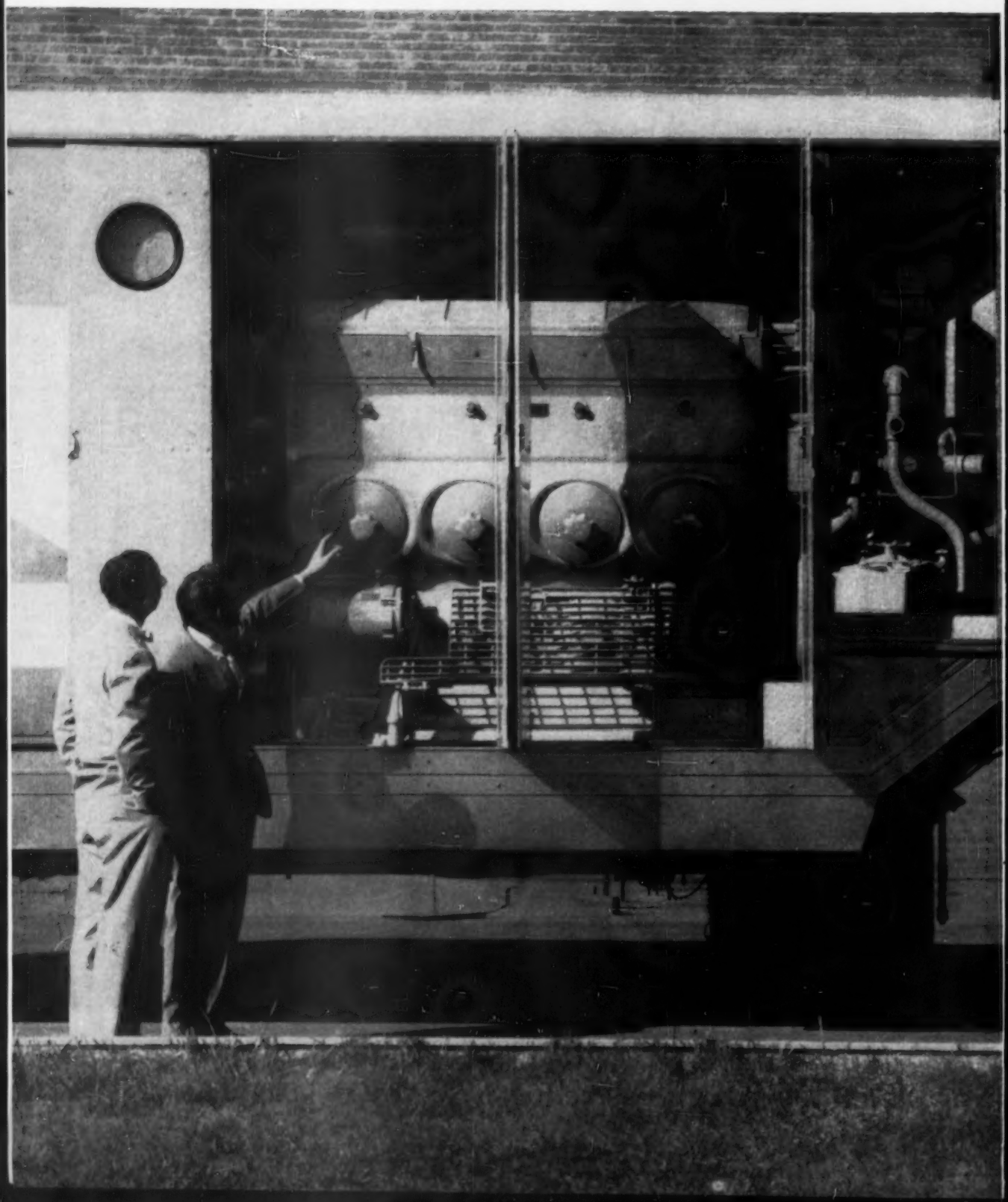
MI terminating in main Japan Oven control center switchboard at Poinsett Lumber and Manufacturing Company, Anderson, S.C.

Ask for a Demonstration To-Day!

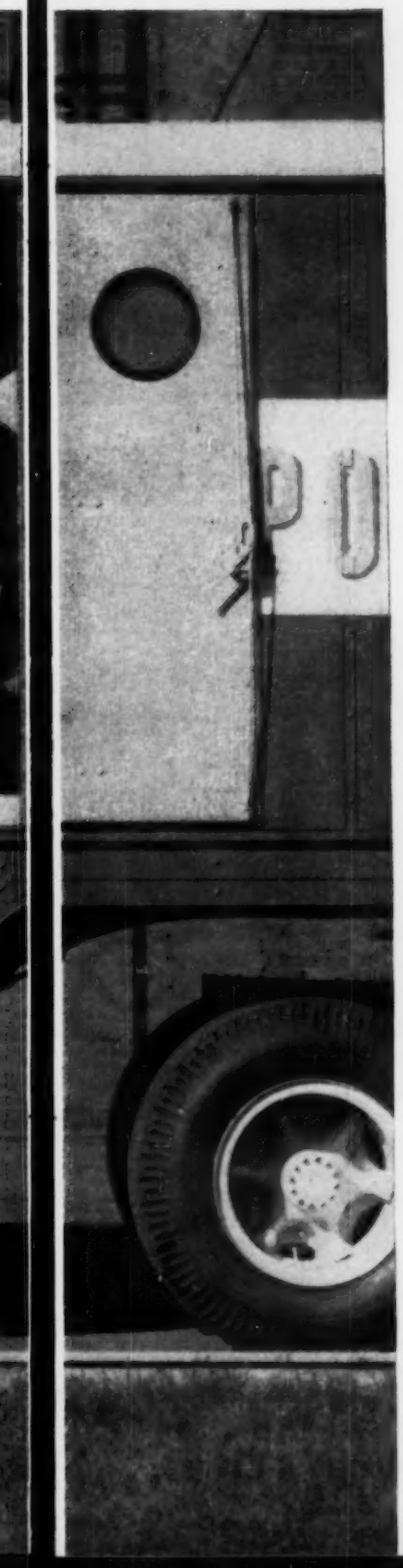
GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service...specify **GENERAL CABLE**

Built only to



produce electric power



The Diesel engine was first designed and built for mechanical drive. It was much later that Electro-Motive incorporated this principle in designing and building a prime mover specifically for electric power generation.

It was, in fact, in 1932 that two experimental electric power generating sets were tested at the Chicago Century of Progress Exposition. These two cycle engines were a revelation in design —compact and lightweight.

Refined and improved over the years, this advanced prime mover has been produced in quantity by Electro-Motive—enough, in fact, for a total generating capacity of more than 24,000,000 kw. Above all, this engine has proved its dependability, operating for thousands of hours under every conceivable condition with only the most routine type of servicing.

It is this wealth of tested and proven experience that is your best assurance when you install Electro-Mobile equipment. Why not discuss its potential for low load factor generation with your Electro-Motive representative?

1000 kw units for use on sidings or placed on piers for semi-permanent use.

500 kw units offer excellent mobility for many temporary applications.

LIVE BETTER ELECTRICALLY

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS
Sales offices in Chicago, New York, St. Louis, San Francisco
In Canada: General Motors Diesel Limited, London, Ontario

Whatever you want in control cable—Anaconda has it!

PEAK RELIABILITY. Anaconda's Type ANW-rubber-insulated control cable is a high-quality product which features unusual heat resistance. It is also highly resistant to attack by moisture, acids, alkalies and other chemicals. Individual conductor covering and over-all jacket of neoprene.

MULTIPLE USE. Anaconda thermoplastic control cables can be installed aerially, in conduit, underground in ducts—or buried directly in the earth. They are available with either polyethylene (600 or 1000 volts) or Densheath* vinyl resin (600 volts) insulation and Densheath over-all jacket. Also with Densheath conductor covers on request.

OZONE-RESISTANCE. For station control applications where ozone conditions prevail, Anaconda offers a special low-voltage butyl-insulated cable. This control cable not only resists ozone, but individual conductor covering and over-all jacket of neoprene provide maximum insurance against moisture and mechanical injury.

SPACE-SAVER. You can install a 12-conductor cable in conduit now carrying a 6 or 7—with Anaconda Type PND† Control Cable. Individual conductor coverings of moisture-, oil- and gasoline-resistant nylon. Over-all Densheath jacket. Designed for general-purpose control requirements where space is a limiting factor.

Permanent Full Color Coding on rubber cables, by means of Anaconda's rubber-base coating, assures quick and positive circuit identification. Coding by surface printing, which conforms to IPCEA standards, also available. On thermoplastic cables, full color coding with pigmented insulation and surface printed coding are likewise offered. For information on any of Anaconda's Control Cables—including cables engineered for more specialized control requirements—see your Anaconda distributor or the Man from Anaconda. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off. 57589
†Trademark

SEE THE MAN FROM ANACONDA®
FOR CONTROL CABLE

FASTEST WESTERN SERVICE – At Orange, California, Anaconda's expanded, modernized mill fabricates and stocks copper and aluminum wire and cable for *every type of application.* Anaconda's Western Distributors thus can assure the fastest possible service on all West Coast needs. See Anaconda Sales Offices: Los Angeles, San Francisco, Seattle, Denver.

...quality that can't wear off

On the surface, many ground rods look good. But in *service*, there's a big, better difference to Hubbard Copperweld. By an exclusive, molten-welding process, a thick, uniform layer of pure copper is fused to an alloy steel core. Instantly, the two metals become as one, with the desirable qualities of each inseparably joined. As a result, Hubbard Copperweld Sectional Ground Rods have the *permanent* rust resistance and conductance of solid copper, plus the strength and easy driving qualities of steel.

DRIVE DEEP. Additional sections of Hubbard Copperweld Ground Rods may be added as required to reach the good conducting soils of permanent moisture. Resistance can be measured after driving each section, and allowance made for seasonal variation.

Your Hubbard Distributor carries complete stocks of Copperweld Sectional Ground Rods and accessories. Contact him for prices and full information.

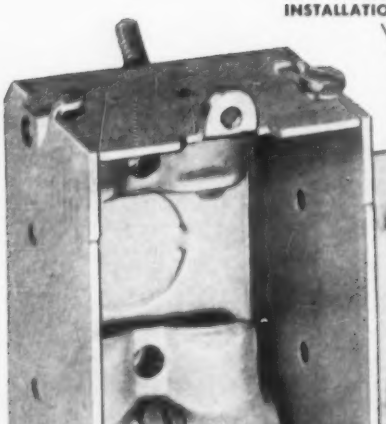
HUBBARD AND COMPANY

Pittsburgh 1, Pa. • Chicago 50, Ill. • Oakland 8, Calif. • Plano, Texas

APPLETON announces another First!

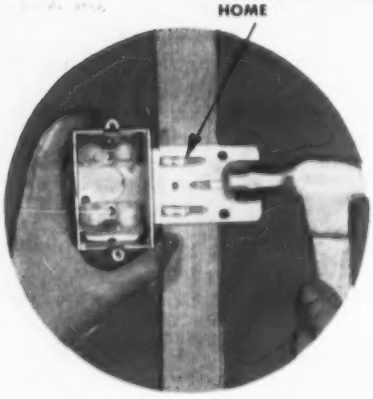
new

"Eagle Claw" Box



Pat. Pending

NO NAILS REQUIRED!



There are holes at end of bracket for the rare occasion when switch box must be set on studding at full length of bracket.

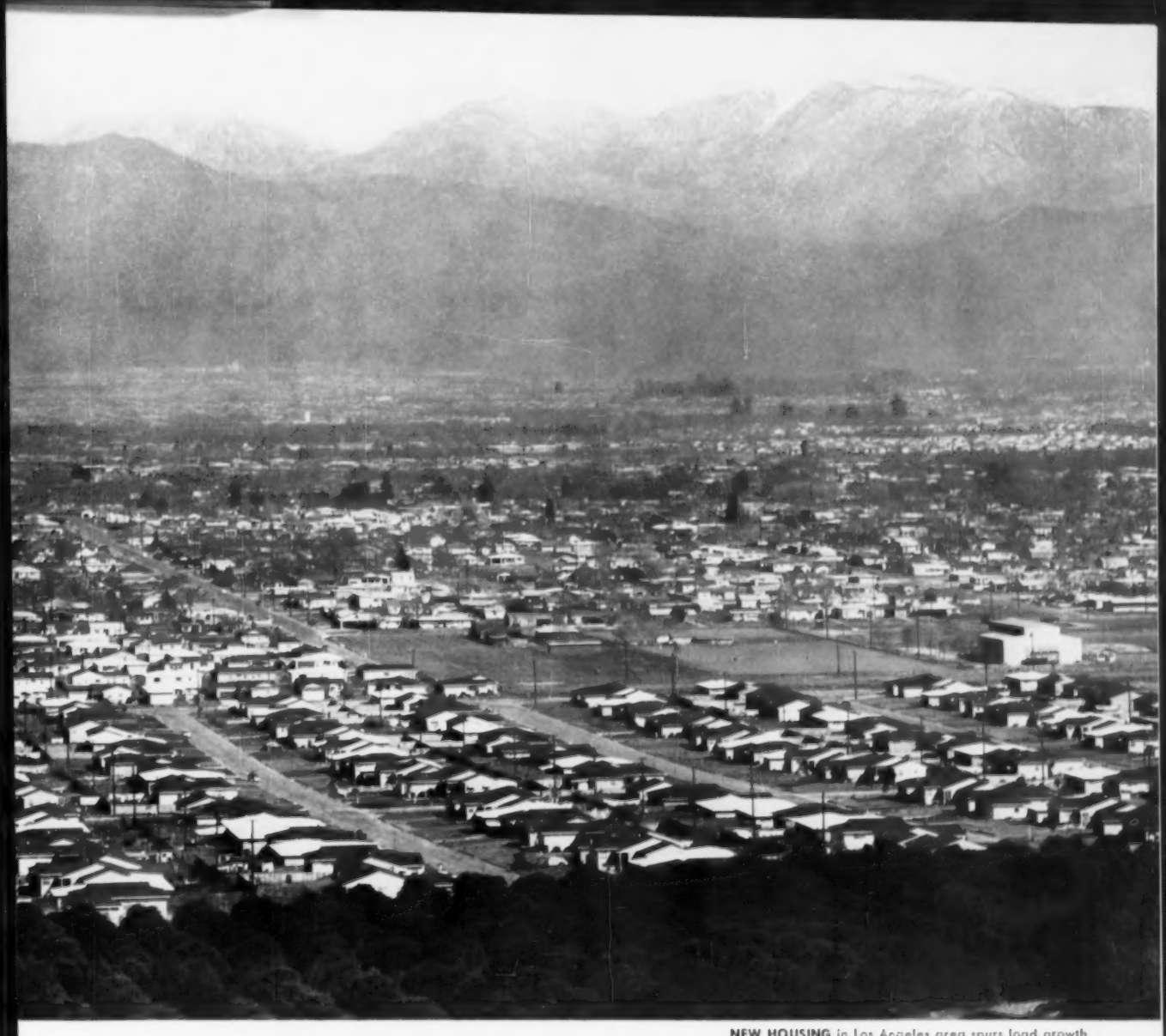
Here is the industry's first Underwriters' approved Switch Box which requires *no nails* to mount! The notched prongs are simply hammered into the wood and the "EAGLE CLAW" bracket locks the box to the studding. As prongs enter the wood, they curve away from each other . . . can't possibly work loose! Due to special compensating angle of bracket, box always rests at true 90° angle after prongs are hammered in. Feature for feature, nothing touches these new, money saving **APPLETON "EAGLE CLAW" Switch Boxes.** Specify them on your next order!

Sold Through Franchised Wholesalers Only

APPLETON ELECTRIC COMPANY • 1701 Wellington Avenue • Chicago 13, Illinois

APPLETON ELECTRIC PRODUCTS

Rely on APPLETON... The Standard for Better Wiring



NEW HOUSING in Los Angeles area spurs load growth

DISTRIBUTION TRENDS REPORT:

Keeping ahead of load growth makes Southern California Edison one of fastest-growing utilities

Now serving the electric power needs of some 4,200,000 people in ten southern and central California counties, Southern California Edison is one of the fastest-growing investor-owned electric utilities in the nation. In new meters added, it has topped all others for five of the last six years. Over the last decade, it has more than doubled its meters to a present total of almost 1,500,000. In fact, during the five years ending December 1956, its new meters were equivalent to the number required to serve a city of 800,000 population.

Initial cause of this growth has been the tremendous population influx into SCE's service area. But this in turn has touched off an even greater growth in commercial and light industrial loads. The distribution challenge facing SCE, therefore, has been to keep simultaneously ahead of a booming growth in three areas of load—residential, commercial and industrial.

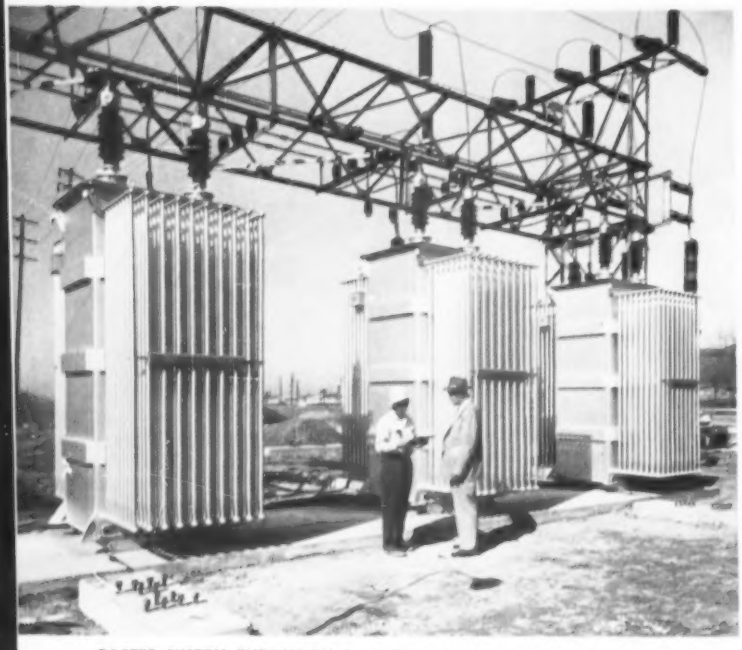
MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's how General Electric helped SCE meet this challenge

DISTRIBUTION TRENDS REPORT:

Co-ordinated headquarters planning, based on "grass-roots" district recommendations, helps Southern California Edison prepare for mushrooming growth in all load areas



FASTER SYSTEM EXPANSION for SCE, through simplified purchasing and shorter deliveries, is permitted by repetitive-manufacture of G-E medium transformers. These in recently expanded Puente Substation, being discussed by G. Canfield (left) and W. I. Hartshorn, Foreman and Supervisor of SCE's Construction Dept., are three single-phase oil-insulated air-cooled units, rated 66 kv, 3333 kva.

The phenomenal load growth in Southern California Edison's service area is based on a variety of factors. Besides higher domestic consumption, they include increased industrial productivity, more shopping centers, offices, schools and hospitals, and more widespread use of improved lighting, air conditioning and electronic devices. The effect of these factors was reflected in 1956 kwhr sales when commercial sales were up 18.2%, domestic sales 13.5%, and industrial sales 11.1% over the previous year. To bring its long-range distribution planning into focus every year, SCE must know what and where the greatest anticipated growth will be, and for this it relies on "grass-roots" information from its 29 field districts.

HOW THE PLANNING WORKS — Each of SCE's districts has a distribution superintendent responsible for operation and planning, in addition to a commercial manager. The distribution superintendent continually makes long-range growth plans based on load studies and land developments. Once a year these plans are formalized into specific recommendations for new expenditures and installations keyed to growth areas. In this he works closely with the

SUSTAINED ACCURACY of G-E single-stator watthour meters is made possible by magnetic suspension feature which eliminates bearing wear. M. G. Spaller, Asst. District Supt. for SCE, observes installation by J. L. Mertel in new home.

REDUCED SYSTEM LOSSES and higher kilowatt loadings on feeders are obtained by SCE with this 225-kvar bank of open-rack pole-top G-E fixed capacitors. They also help maintain improved voltage levels by relieving generating and transmission facilities of the need for supplying the basic kvar load.

PLANNING CONFERENCE on distribution system expansion brings together (left to right) G. A. Davis, SCE Senior Planning Engineer; P. M. McCann, SCE Supt. of Distribution; W. T. Scott, G-E Sales Engineer; R. B. Kimball, G-E Electric Utilities Application Engr.; and E. H. Clark, SCE Asst. Chief Distr. Engr.

district commercial manager, who contributes information about the business and manufacturing expansion planned for the area within the next year.

MASTER PLAN PREPARED AND IMPLEMENTED—District recommendations are funneled to headquarters distribution engineering, where they are co-ordinated with the Company's overall generation and expansion plans. The final result is an integrated, master plan for expansion of the distribution system in the coming year. In implementing these plans, Southern California Edison has made extensive use of General Electric engineering assistance and equipment.

Working closely with SCE substation and protection engineers, General Electric application engineers provided engineering assistance in applying protective relaying equipment, regulators, and circuit breakers. In addition, General Electric engineers designed and applied a special ceramic bushing for capacitors to resist the area's severe atmospheric conditions.

When you specify General Electric, you take advantage of the latest advances in apparatus design, construction, application and the assistance of complete engineering services. To help utilities keep service running smoothly, highly trained General Electric service engineers plus a network of Service Shops stand ready to meet any and all maintenance and repair needs—day and night.

For full information on distribution equipment and Distribution System Services, contact your nearby General Electric Apparatus Sales Office, General Electric Company, Schenectady 5, N.Y.

LONGER SERVICE LIFE for G-E distribution transformers is aided by such exclusive features as one-piece stainless-steel clamping bands that result from continuing product development. Here, SCE linemen hook up a 15-kva pole-type G-E distribution transformer for residential service in a nearly completed housing development.

ADDED DEPENDABILITY of G-E distribution transformers stems in part from production-line impulse testing, most sensitive method known. These single-phase 100-kva G-E units are being connected to serve a large super-market in SCE service area.

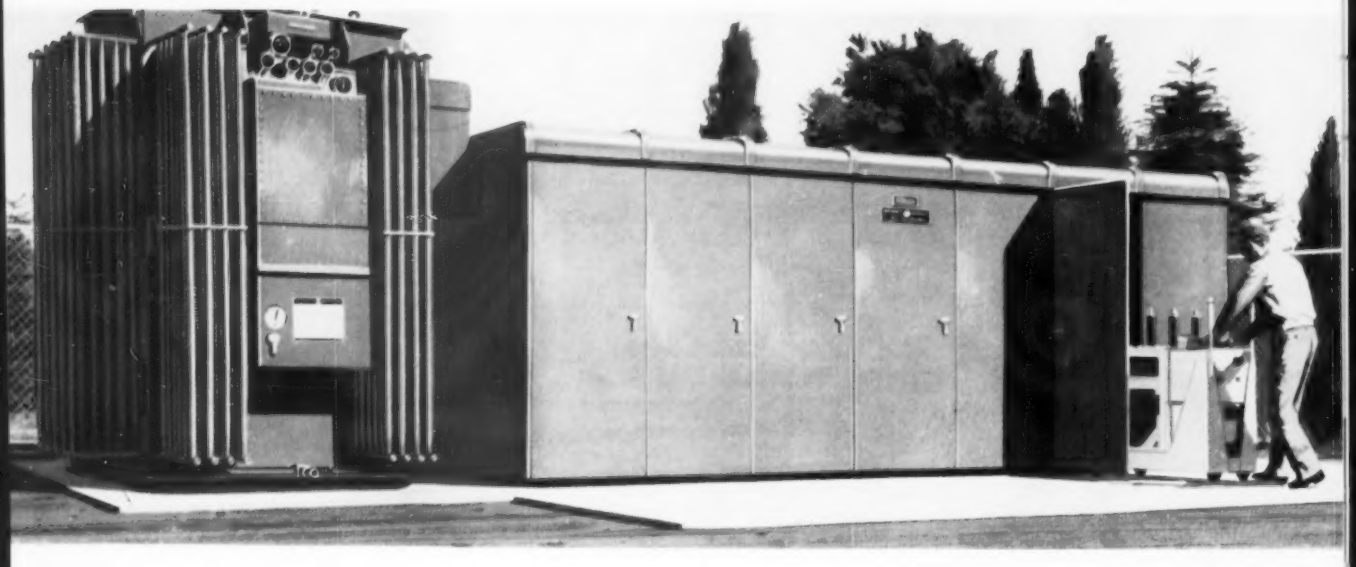
MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's why it pays to see General Electric about your distribution problems

DISTRIBUTION TRENDS REPORT:

Southern California Edison is one of the major utilities using General Electric factory-built unit substations



HERE'S WHY:

Among the nation's major electric utilities, Southern California Edison is one of more than 100 that are saving time and money through reliance on General Electric factory-built unit substations.

These complete, ready-to-install substations are fully co-ordinated for dependable performance. With only one specification—one invoice—required, your purchasing is enormously simplified. There are no extras or accessories to buy, which makes the substation's low installed cost a realistic, predictable one. And because they are pre-engineered by General Electric, your engineers are relieved of many of the time-consuming technical details and made available for more productive work.

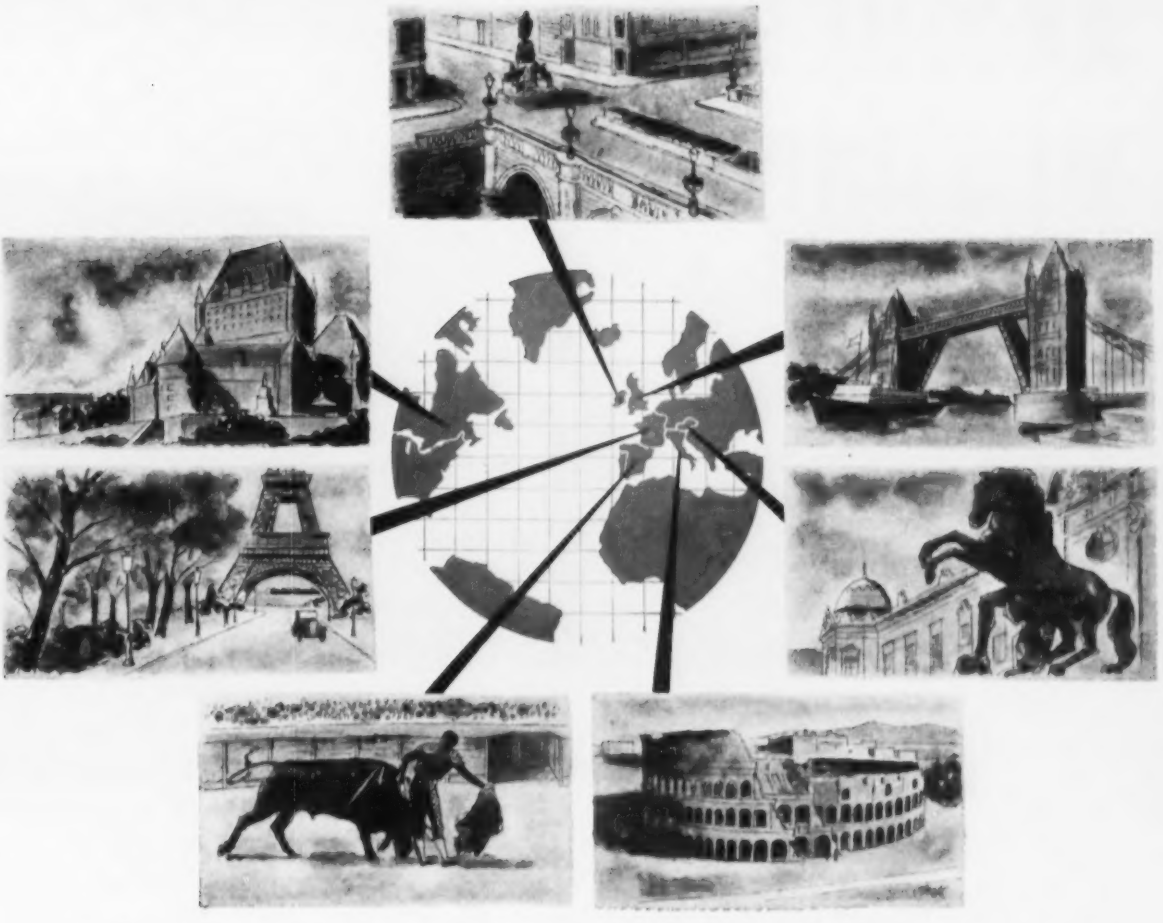
When you specify General Electric, you get the benefit of General Electric Distribution System Services which include extensive product development facilities—headquarters system planners—district application engineers and product specialists—equipment installation and field service engineering.

These services offer assurance of maximum operating continuity, on-the-spot application help, equipment efficiencies, valuable help in system design and techniques. Get the full story from your General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 303-5

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC



Here, too, we make Nichrome*

Perhaps you didn't know that the world-famous alloy Nichrome is produced not only in The United States, but also in 6 Driver-Harris plants in England, Ireland, France, Italy, Austria, Spain, and in Canada by The B. Greening Wire Company. Also, Nichrome is a registered trade-mark in 55 nations.

At first, fifty-odd years ago, we manufactured electrical resistance alloys for furnace elements and domestic heating appliances only. Today we produce 132 different high nickel alloys in many different forms and in hundreds of sizes, for almost every kind of domestic and industrial application—of which Nichrome is the most illustrious.

Whenever you buy Nichrome, you are assured of the unsurpassed and unvarying *quality* which has made Nichrome the supreme world standard for electrical-resistance and heat-resistant alloys. This uniformly high quality, which we jealously guard as our most priceless possession, results from the technical excellence, the productive skill, and the quality controls the Driver-Harris craftsmen have gained in over 50 years of experience—and which are maintained with equal rigor in all Driver-Harris plants here and abroad. The result is a continuous benefit to the entire electrical, electronic, and heat-treating industries.

*T.M. Reg. U. S. Pat. Off.

Nichrome is made only by

Driver-Harris COMPANY HARRISON, NEW JERSEY

Manufacturing plants also in: ENGLAND • CANADA • IRELAND • FRANCE • ITALY • AUSTRIA • SPAIN

MAKERS OF THE MOST COMPLETE LINE OF ALLOYS FOR THE ELECTRICAL, ELECTRONIC, AND HEAT-TREATING INDUSTRIES

ANOTHER WESTINGHOUSE FIRST

NEW SHIPPING METHOD DELIVERS GIANT TRANSFORMER

For the first time, a transformer has been shipped as part of its own railroad car! En route to the Ohio Power Company's Kammer plant at Captina, West Virginia, this 200,000-kva, 330-kv autotransformer became the center section of a revolutionary three-section railroad car—the nation's first car of this type.

Designed by Westinghouse and built by the Greenville Steel Car Company, the new car will permit transformers up to 250 tons to be shipped in one piece—upright, and without sectionalizing.

The new car consists of two identical end sections, with the transformer comprising the center section and suspended between trusses mounted on each end. Although the car is 90 feet long when

AS PART OF CAR, REDUCES INSTALLATION TIME AND COST

loaded, it can negotiate the same curves as a standard boxcar. The result: direct routing, helping to speed your construction schedules.

The combination of this new shipping method and Westinghouse "Form-Fit"® design provides a sure means of producing transformers with ratings adequate for future needs. Utilizing basic shell-form design with the core surrounding the coils, Form-Fit design provides a more compact transformer with superior mechanical and dielectric strength, greater thermal capacity—the highest rating-per-pound available. The new railroad car adds *extra* growth potential to this "room-to-grow" design, by providing assured delivery for your higher capacity transformers of the future. J-70828

YOU CAN BE SURE...IF IT'S
Westinghouse

The new railroad car can support its load only six inches above the rails—two feet lower than on a depressed-center car. For this delivery, top clearance was sufficient to permit suspension a full foot above the rails.

Untight squeeze—loaded on the new car, this transformer for Ohio Power Company stands 19'2" above the rails; bridge clearance here is 20'4"; net, 14" top clearance. This allows direct routing, speeds delivery and construction schedules.

1,200,000 HORSEPOWER AT S. MORGAN SMITH

This view of the assembly floor at SMS Plant #2 shows six (6) turbine scrolls* and other components under construction at one time. They represent over 1,200,000 H.P. for the U. S. and South America. As identified by number, they are:

	PLANT	No. UNITS	H.P.	HEAD	SCROLL
1* & 2* Idaho Power Co.	Brownlee	4	144,000	250′	18′ T-1 Welded
3* & 4* C.E.M.I.G., Brazil	Itutinga	2	20,000	98′	13′ Riveted
5* Pacific Pr. & Lt. Co.	Swift #1	3	100,000	350′	11′ T-1 Welded
6* Montana Power Co.	Cochrane	2	42,000	80′	22′ Welded
7 (Runner) Portland Gen. Elect. Co.	Pelton	3	52,200	150′	15¼′ Riveted
8 (D. T. Liner) Pacific Gas & Elect. Co.	Butt Valley	1	52,000	280′	9½′ Welded

The T-1 scrolls for Brownlee – the first plant of the Hells Canyon group on the Snake River – are the first usage in the hydraulic turbine industry of this new alloy for field welded scrolls. Swift Creek also has T-1 scrolls, which are shop welded.

Whatever your needs in hydraulic turbines and accessories, SMS offers you over three-quarters of a century's experience in design, engineering and manufacturing, plus the most modern hydraulics testing laboratory available. For full information, write to S. Morgan Smith Company, York, Pa.

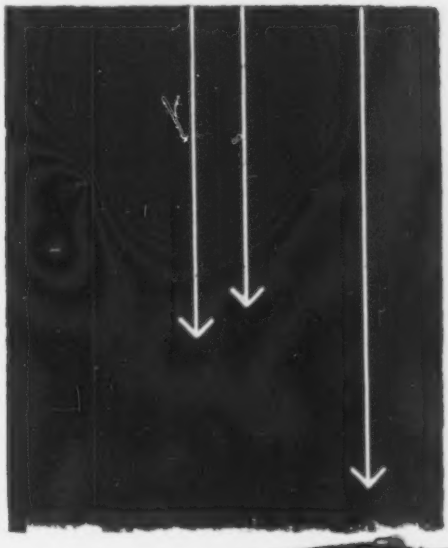
More Power To . . .

S. MORGAN SMITH

HYDRODYNAMICS

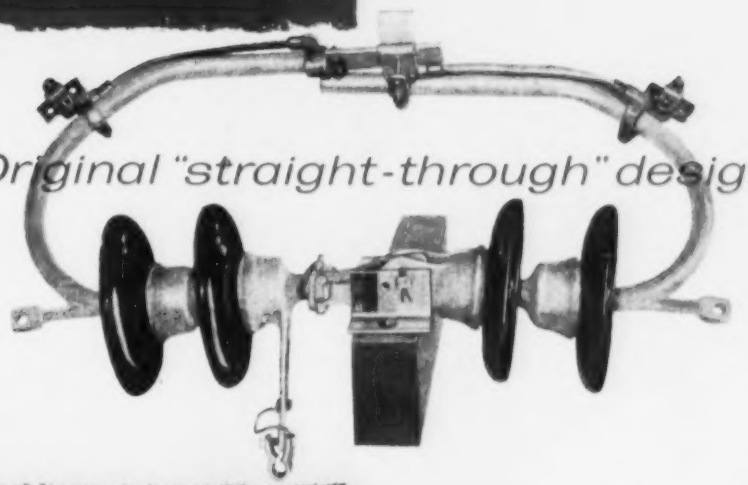
AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

Rotovalves • Ball Valves • R-S Butterfly Valves • Free-Discharge Valves • Liquid Heaters • Pumps • Hydraulic Turbines & Accessories

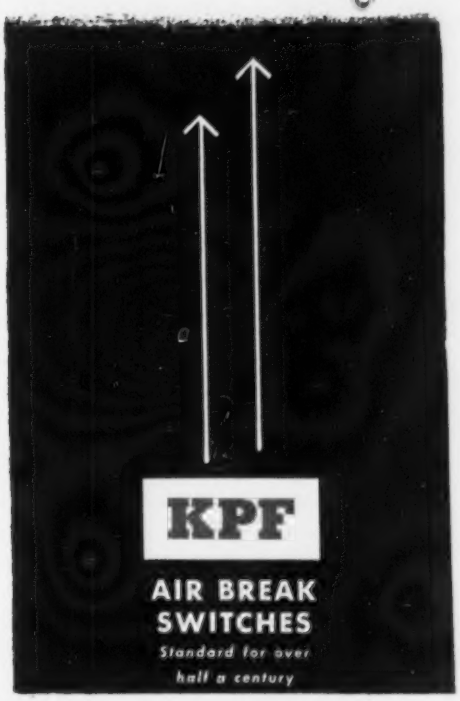


Only KPF switches look like this

simple, attractive, trouble-free, proved in 50 years service



Original "straight-through" design



You always know when a power company is using KPF switches. (As more and more are today). You can't miss the clean, functional "straight-through" appearance of KPF phase units. This same design simplicity that produces pleasing pole top appearance also insures all-weather operating ease. KPF switches have no temperamental mechanisms to malfunction, freeze, lock, need lubrication or wear out.

KPF switches have proved their dependability in over 50 years service on major utilities. Make a test installation of the original, "straight-through" air break switch on your system this month.

Write direct for catalog.

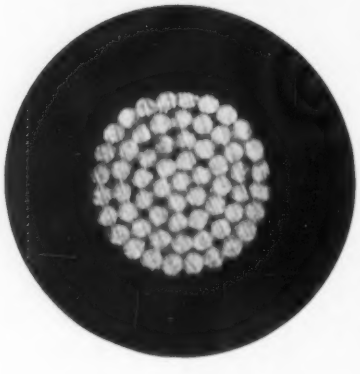
KPF ELECTRIC COMPANY
Dept. W, 1624 E. Alpine Ave.
Stockton 5, Calif.

4264

The radically new, better way to make 15 KV BUTYL-INSULATED CABLE!

ROEBLING

VCV



NEW VERTICAL CONTINUOUS VULCANIZATION ASSURES CONCENTRIC INSULATION. THE RESULT IS UNIFORMLY HIGH DIELECTRIC STRENGTH AND IMPROVED CORONA LEVEL—THROUGHOUT THE LENGTH OF THE CABLE!

Unlike cable cured by other means, butyl-insulated high-voltage cable produced by Roebling's new Vertical Continuous Vulcanization method is never eccentric; abraided, flattened, scored, and its diameter never varies. Conductor is centered *through every inch of the cable.* What's more, the butyl insulation, even in "thick-wall" cables, is dense, free from internal blisters because every foot is cured at the same temperature and pressure. Controlled concentricity, plus uniform dense insulation, gives these cables their exceptional dielectric strength and corona level.

This is superior cable—we don't know how else to say it. For complete information write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING VCV 15KV CABLES are available in a complete range of strand constructions and insulation thicknesses—and with shielding, sheathing and other specifications that exactly meet your requirements.

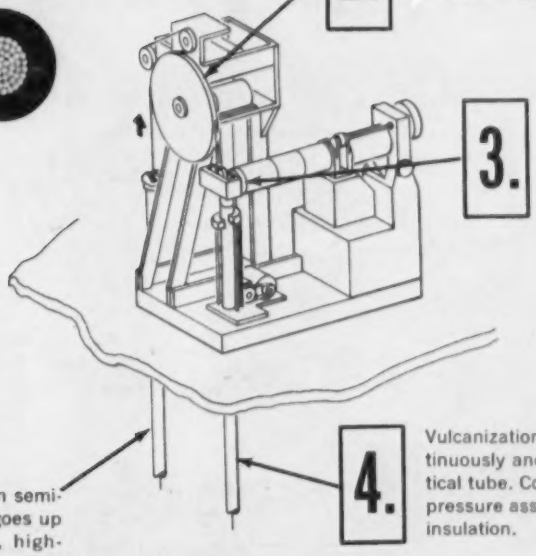
ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Here's how ROEBLING VCV *works!*

2. Conductor is put under controlled tension, which is maintained during entire insulating process.

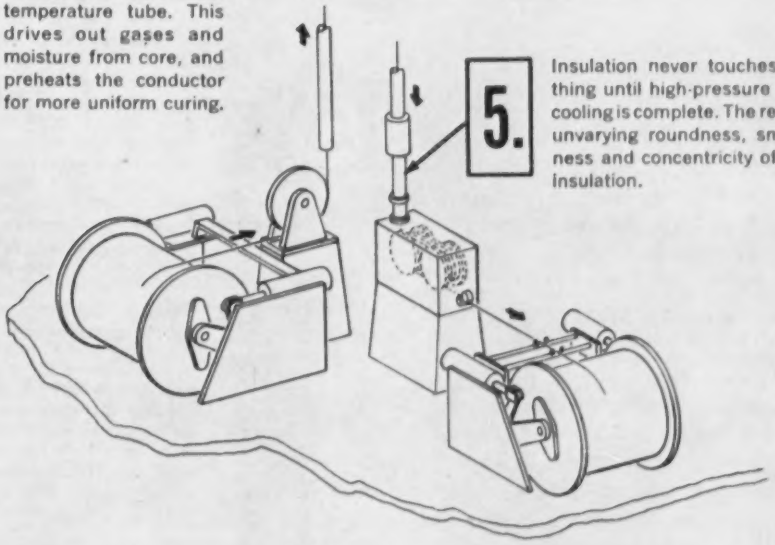
3. Butyl insulation is extruded downward around conductor.

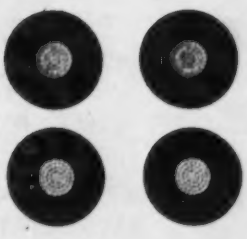


1. Strand wrapped in semi-conducting tape goes up through 4-story, high-temperature tube. This drives out gases and moisture from core, and preheats the conductor for more uniform curing.

4. Vulcanization takes place continuously and uniformly in vertical tube. Constant high steam pressure assures dense, sound insulation.

5. Insulation never touches anything until high-pressure water cooling is complete. The result is unvarying roundness, smoothness and concentricity of butyl insulation.





These samples from a single conductor, 500 MCM cable with 42/64 insulation produced by Roebling VCV method were cut (left to right) at 10, 50, 500 and 1000 ft. intervals. Note how all sections have identical diameter and concentricity. Impartial utilities' experts who examined these samples say they've never seen anything to compare with them for uniformity, roundness, concentricity, smoothness and density of insulation.

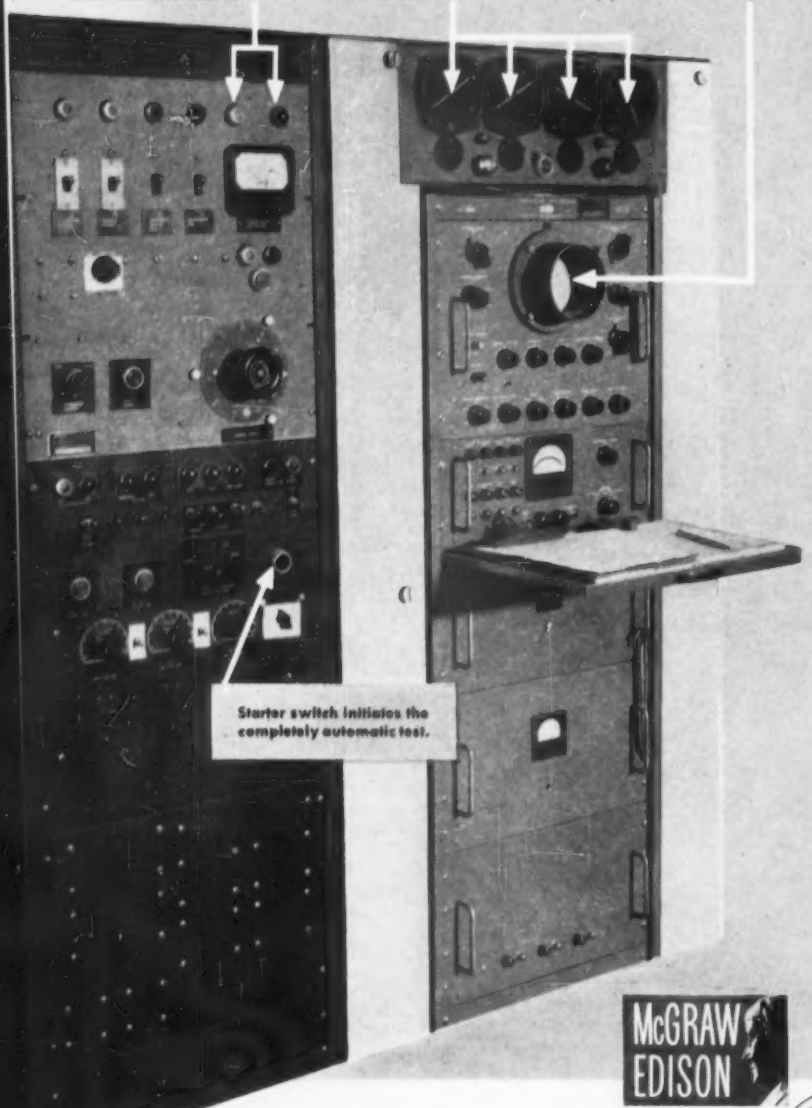
A Report on IMPULSE TESTING of *Pole Star* DISTRIBUTION TRANSFORMERS

Control Center for Pennsylvania's Production-Line Impulse Testing Apparatus

Signals light up and testing automatically stops if a failure—even a single-turn fault—occurs. An alarm bell also sounds.

Large, dial-type indicators provide a check on voltage settings for each test.

Technician in charge observes oscilloscope, which shows the complete impulse voltage wave for every phase of the test cycle.



- What It Is . . .
- What It Tests . . .
- What It Accomplishes . . .

WHAT UNITS ARE TESTED

All Pole Star distribution transformers from 3 through 167 kva with high voltage ratings through the 18-kv class are impulse tested. The special apparatus used is an integral part of the production line at Pennsylvania Transformer's Canonsburg plant. Both high voltage and low voltage windings are tested.

NATURE AND MAGNITUDE OF THE IMPULSE VOLTAGE

Test voltages applied to the high voltage windings are 10% above the basic impulse level (BIL) values listed in ASA Standards C57.12. The impulse voltage—which is basically the same as the sudden surge that occurs as the result of lightning—rises to crest value in just 1½ microseconds (millionths of a second) and declines to one-half crest value in 40 microseconds.

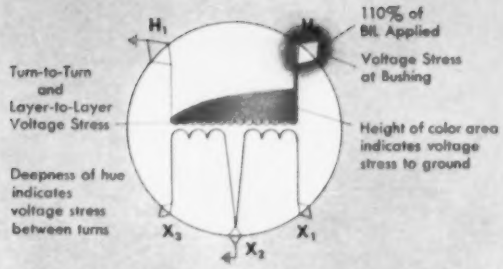
Because of the low impedance of low voltage windings, a wave of shorter duration is used to simulate more closely the surge effects of natural lightning. Low voltage windings thus are tested at a standard voltage value by applying an impulse voltage with a wave shape of ¾ x 1½ microseconds across one-half of the winding. This induces an equal voltage in the other half, so that twice the applied voltage appears across the total low voltage winding. Simultaneously, an impulse voltage of full BIL value is induced in the high voltage winding.

HOW THE TESTS ARE CONDUCTED

So that the transformer itself will be subjected to the full force of the impulse voltage, both conventional and protected Pole Stars are impulse tested *without arresters* or with arresters rendered inoperative. The tests, which are fully automatic, are conducted in the following manner, with the tank

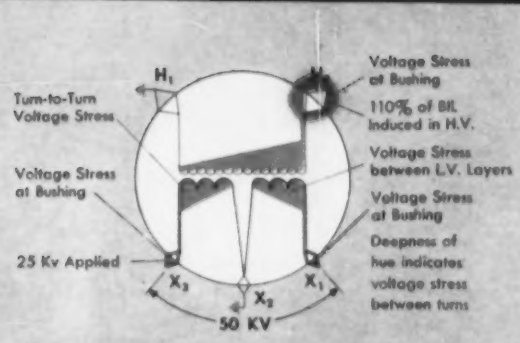
McGRAW EDISON

PENNSYLVANIA DISTRIBUTION



TESTING OF HIGH VOLTAGE WINDINGS

Depicted here is one step in the testing of high voltage windings. In the second step, impulse voltage is applied to H_1 while H_2 is grounded. Test voltages are 10% above the basic impulse levels.



TESTING OF LOW VOLTAGE WINDINGS

Applying impulse voltage in one-half of the low voltage winding induces an equal voltage in the other half. The test also induces an impulse voltage of full BIL value in the high voltage winding.

grounded through a shunt impedance.

For the h.v. winding test, impulse voltage is applied to H_1 while H_2 and X_2 terminals are grounded to the tank. The procedure then is reversed for tests on H_2 while H_1 is grounded.

For the l.v. winding test, impulse voltage is applied to X_1 while H_2 is grounded and a voltage limiting impedance to ground is connected to H_1. The X_2 terminal is grounded and X_3 is ungrounded.

In every phase of the test cycle, the technician in charge observes an oscilloscope that shows the complete impulse voltage wave. Also, an electronic relay is connected so that any failure—even one so minute as a single-turn fault—will automatically stop the testing to indicate the test in which failure occurred.

HOW MUCH OF THE TRANSFORMER IS ACTUALLY TESTED

Traveling at the speed of light, the impulse voltage stresses the turn-to-turn, layer and section-to-section insulation, as well as all insulation to grounded parts, such as the core, core frame and tank. In addition, the impulse voltage fully tests all bushings, leads, tap changers and other accessories. Only transformers that are properly manufactured of highest quality, defect-free material can pass this rigorous test.

WHAT MORE THAN ONE YEAR'S TESTING HAS ACCOMPLISHED

Before production-line impulse testing was initiated at Pennsylvania Transformer, basically the same tests were conducted on Pole Star models and stock units selected at random. This method of testing helped prove the soundness of the Pole Star design, which was further demonstrated throughout the years by Pole Stars' reputation for long-term, trouble-free service.

More than a year-and-a-half of production-line impulse testing, however, has served to make this high quality transformer even *better*. The chief contribution of full-scale impulse testing has been the detection of occasional minor discrepancies—chiefly in component parts but also, from time to time, in certain manufacturing details involving the human element. While these errors are so slight that the units in which they occur have passed *all standard ASA tests* prior to impulse testing, they do represent sources of potential trouble—trouble which may never occur, but which might, in some cases, develop within hours after a transformer is installed.

Of particular significance so far as Pole Star design and construction are concerned is the fact that, during the first full year of testing, actual winding failures occurred in only *one-half of one percent* of the many thousands of transformers tested.

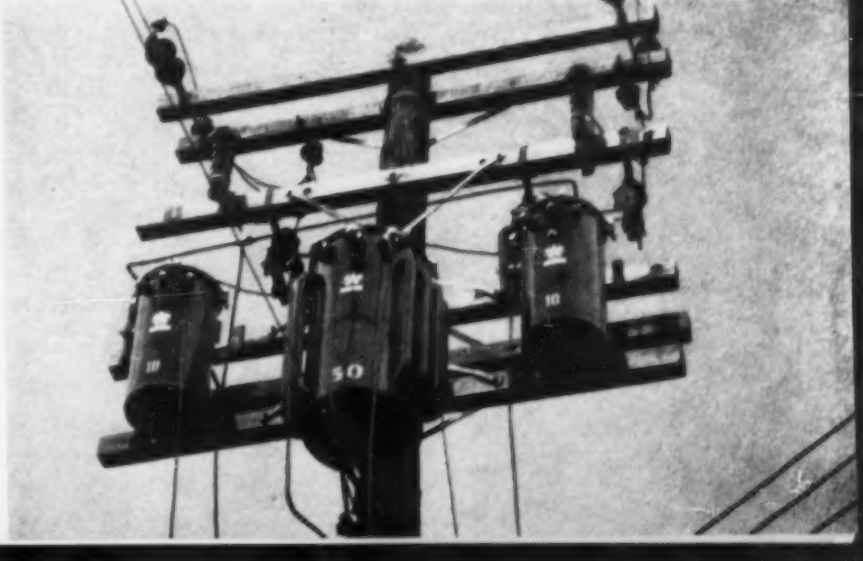
When discovered, *all* causes of failure during impulse testing are attacked with skill and determination by the Pennsylvania engineering and production staffs. Thus far the resulting changes in components (some have been completely redesigned) and improvements in methods have achieved remarkable results. For example, the percentage of rejects for all causes during the last half of the first full year of testing (1.55%) was *over 50% less than for the first six months of the year*. While the rate of percentage reduction may be slower henceforth, production-line impulse testing will continue to safeguard quality, and will be a valuable tool in the hands of production and engineering personnel.

WHAT IT ALL MEANS TO YOU, THE PURCHASER

Even longer average service life than in the past is the principal benefit to be gained by the purchaser of Pole Star distribution transformers as a result of production-line impulse testing. Of course, longer service life means less maintenance, fewer replacements, lower costs—and better service to customers.

Impulse testing provides a highly efficient and constant check on production methods, component parts, and design effectiveness. Call it "quality control" or by any other name—the net result is that the purchaser *always* gets the outstanding quality and efficiency that are inherent in the Pole Star design. There can be no doubt, too, that the knowledge and experience gained from impulse testing will light the way to an even finer Pole Star of the future.

PENNSYLVANIA TRANSFORMER DIVISION
McGRAW-EDISON COMPANY
Canonsburg, Pa.



TRANSFORMERS

MEN RESPONSIBLE FOR

POWER DISTRIBUTION KNOW...

IF IT'S PARANITE IT'S RIGHT!®

FROM AERIAL TO UNDERGROUND CABLE...

Paranite has a cable specifically engineered to meet your most rigid requirements! Super-Pararite® butyl rubber insulations have been developed to withstand special conditions in *your* area. Copper or aluminum bare or weatherproof cables — ACSR or line wire (formerly products of Midland Wire Corporation) are available.

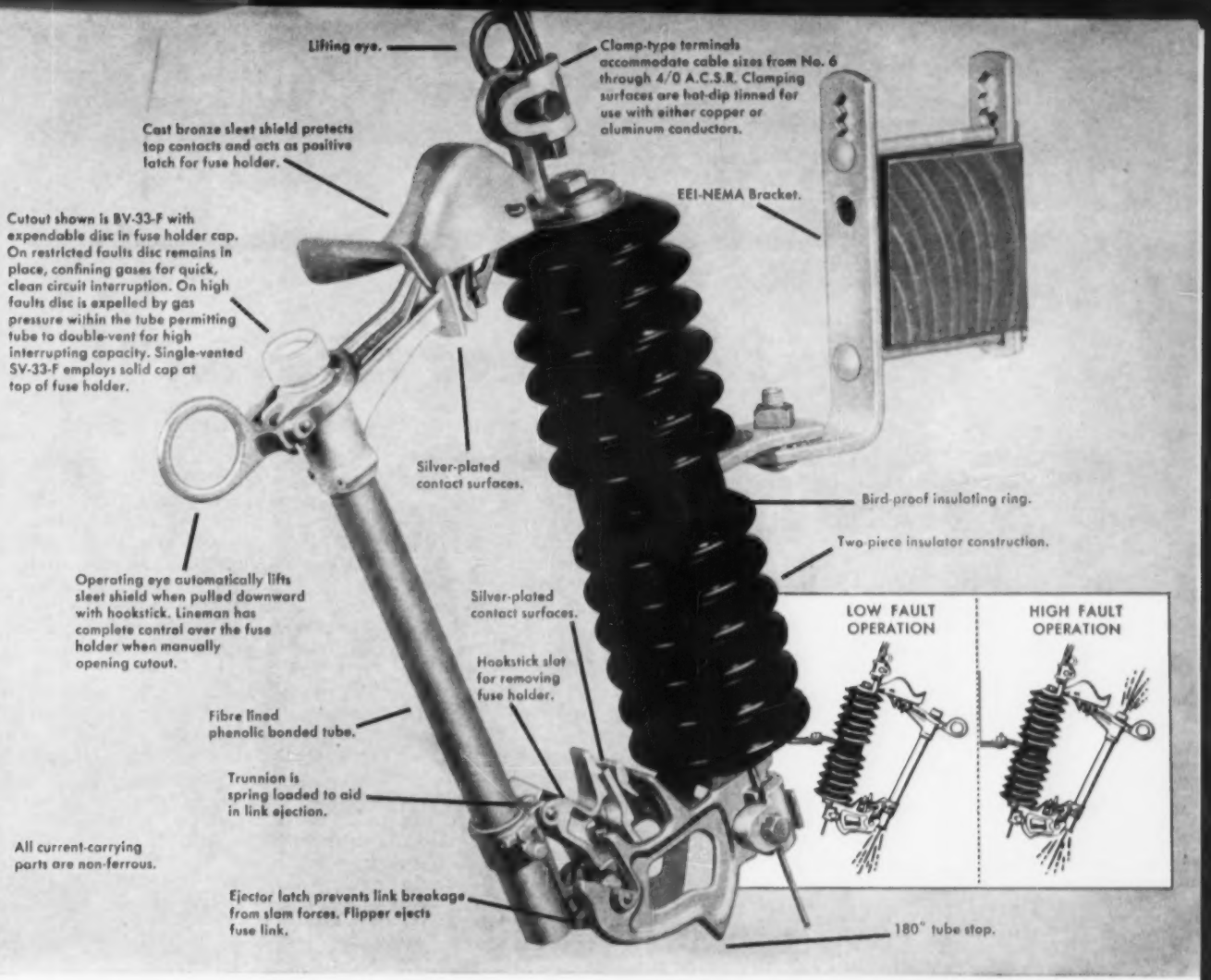
PARANITE WIRE AND CABLE

DIVISION ESSEX WIRE CORPORATION

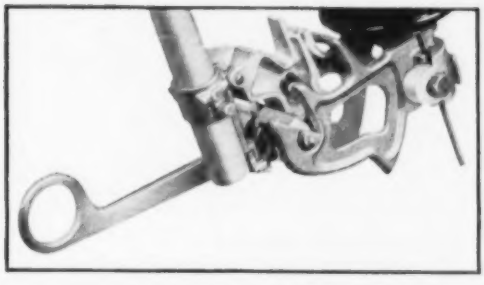
Factory: Anaheim, California

WAREHOUSES* AND SALES OFFICES

*LOS ANGELES, 6415 East Fleet Street; *SAN FRANCISCO, 1077 Howard Street;
*PORTLAND, 525 North Tillamook Street


Lifting eye.
Clamp-type terminals accommodate cable sizes from No. 6 through 4/0 A.C.S.R. Clamping surfaces are hot-dip tinned for use with either copper or aluminum conductors.
Cast bronze sleet shield protects top contacts and acts as positive latch for fuse holder.
EEI-NEMA Bracket.
Cutout shown is BV-33-F with expendable disc in fuse holder cap. On restricted faults disc remains in place, confining gases for quick, clean circuit interruption. On high faults disc is expelled by gas pressure within the tube permitting tube to double-vent for high interrupting capacity. Single-vented SV-33-F employs solid cap at top of fuse holder.
Silver-plated contact surfaces.
Bird-proof insulating ring.
Two-piece insulator construction.
Operating eye automatically lifts sleet shield when pulled downward with hookstick. Lineman has complete control over the fuse holder when manually opening cutout.
Silver-plated contact surfaces.
LOW FAULT OPERATION
HIGH FAULT OPERATION
Hookstick slot for removing fuse holder.
Fibre lined phenolic bonded tube.
Trunnion is spring loaded to aid in link ejection.
All current-carrying parts are non-ferrous.
Ejector latch prevents link breakage from slam forces. Flipper ejects fuse link.
180° tube stop.

Southern States new cutout offers double action for double protection



THE LBV-33-F LOAD BREAK CUTOUT

Has all the features of the BV-33-F, including the expendable disc. It is equipped with a load break mechanism which permits it to serve as a load break switch. It is designed for use with universal button head links only in ratings as high as 100 amperes.

Type BV-33-F—5.2, 7.8, 15, 25 kv—100, 200 amps

THE POWERFUL NEW BV-33-F CUTOUT automatically provides protection against restricted as well as heavy faults.

An expendable disc in the fuse holder cap does the trick! On low faults it remains intact, restricting gases within the tube for maximum arc-quenching ability. On high faults the disc blows out, permitting the cutout to double-vent for maximum interrupting capacity.

Compare the features of the BV-33-F with any other cutout. Add to them the double protection it offers, and you have the answer to your cutout requirements.

For complete details, see your local Southern States representative, or write direct for Bulletin 570-C.

LIVE BETTER ELECTRICALLY

IN CANADA: Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

ELECTRA'S HUSBAND

Why We Behave Like . . .

"WHAT in the world is that?" asked Electra as we saw a small sign on one side of the road while driving through the Stanford campus.

"It's the Center for Advanced Study in the Behavioral Sciences," I explained. "Haven't you heard about it. It just received another five million from the Ford Foundation, I see by the papers. The first grant was for three and half million."

"But what for?" asked Electra. "What do they do with all that money?"

"They think."

"About what, for Heaven's sake? I could think for a lot less money than that. I don't even have to think what I would do with it. A mutation mink or two and some new clothes . . ."

"Hold on—this is for thinking about human behavior. I wonder if they have a project to study why women behave the way they do about styles."

"You should talk. You and your Ivy League, pinched-in, charcoal dulled clothes and convict hair cuts. Tell them to find out what makes you grown men fall for that horrible 'austerity look.'"

"Well, these advanced thinkers are secluded up there on a hill to think about anthropology, biology, economics, philosophy, sociology and things like that."

"Are you sure they aren't up there thinking up new and more fantastic designs for Ford cars—more fins, torpedo tubes, tail lights, and Sputnik hair-dos?" smiled my mischievous lady.

"Oh no," I assured her. "This is all completely noncommercial. It is pure research. All the big outfits are doing it. IBM has a THINK corral for its stable of PhD's down at San Jose. Ford just turns it over to universities, and they love it."

"Sure they love it. Any time you men can sit around and just talk and postulate a lot of theories and ideas, you love it too. Of course you won't admit it. You call it something more fetching."

"Bull sessions?" I teased.

"Among yourselves, yes, but for the public, seminars, conferences, task groups, brain storming and a lot of other gobbledygook. Swing around, dear, and take me up by the ivory tower. I would like to look at it, if you don't mind."

So we circled back and then up the winding road to the redwood contemporary group of glass-faced buildings atop a little hill among beautiful old oaks that somehow had survived this advanced intrusion. It was between sessions so we were able to wander around and admire the very "Avant garde" social hall with low squat furniture, mobiles dangling from the beams and daring combinations of sophisticated colors. Then along the row of cubicles in which the students retire to study and think.

Electra's eye caught sight of the bullet lighting fixtures over the desks. We've had many a seminar ourselves over how our house should be lighted.

"Well," said she. "The boys must have to just sit here in the dark and think all right. If they try to do much reading and studying with those bullets they'll soon go blind for sure, according to your teachings. Who did the lighting for this project?"

"An interior decorator, the architect told me when I asked him. I wish they would study into the behavior of interior decorators. Yes, and architects," I added as I glanced up along the roof and saw rows of plastic bubbles installed to let in daylight. "Maybe they could find out why architects go to such extremes to avoid lighting a place with electricity."

"Perhaps it is their protest against the electronic age," said Electra wisely. "I could teach these researchers a thing or two about human behavior just using my intuition."

Maybe she could at that. That's something the brain boys should really try to fathom—how and why a woman thinks.

Come to think of it myself, they might look into why our electrical industry people behave or misbehave the way they do about competition, bidding, pirating manpower, special deals, not-quite-true advertising, transference of funds and sundry trade practices. But the brain wavers will hardly be aware that these things exist unless they get down to earth with us and experience them. They are unbelievable if not unthinkable. I doubt even woman's intuition is equal to solving that kind of human misbehavior.

"This is all very charming," she observed as we left. "I can't think of a nicer spot from which to get away completely from thinking anything about human beings. There are times when I wish I could too."

As a believer in research I felt I must defend it. "But it may aid us all to understand ourselves better."

"Sitting up there alone in a little box, away from everybody? Don't be silly," she snorted. "The place to find out how people behave is out among them. A mother who is aware can learn the whole evolution of the human race by having and raising children. A father could too if he'd pay any attention to them and participate in the job."

"Oh, you think the classroom is not as important as the laboratory, I see."

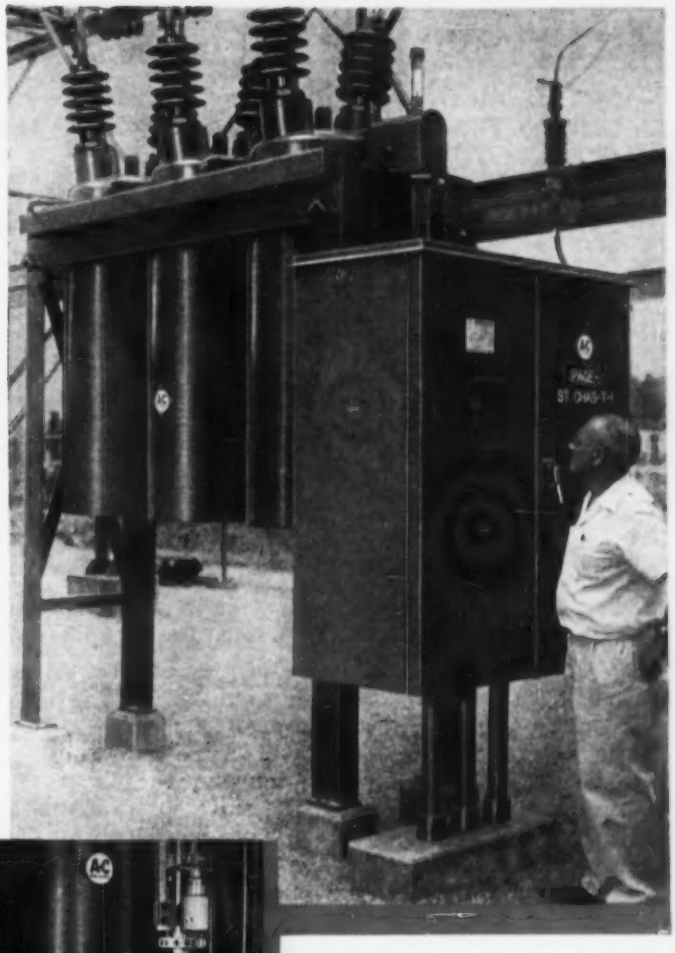
"There you go, theorizing again," she snapped. "I could tell them why you and your friends behave like engineers. In college you shut yourselves off there on the campus with your machinery and slide rules learning all about stresses and fault currents but nothing about girls. We called you the hermits.

"And even now, though you can build bridges or power plants, you hardly know how to dance or what fork to use at a dinner party. You should have been taught to behave like human beings then, not be turned out on us wives to rebuild you."

ALLIS-CHALMERS

"F Z O" frame-type breaker

Has 3 Features You Want Most!



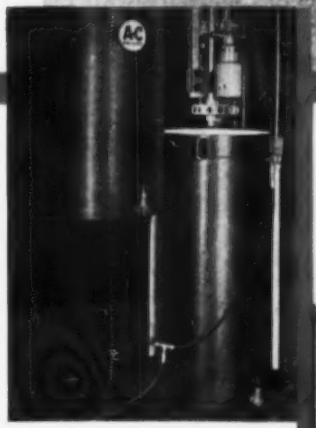
HERE are the outstanding features utilities enjoy with this Allis-Chalmers frame-type breaker.

Pneu-Draulic **operator provides last word in simplicity — ease of inspection — reliability.**

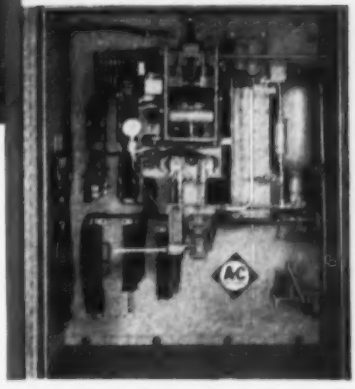
Power-operated hydraulic tank lifter takes all the effort out of raising and lowering tanks — saves time.

Turbo-Ruptor **interrupting device with self-aligning tulip and bayonet contacts.**

In addition, there are dozens of refinements, such as the side trip . . . new oil sampling device . . . float-type oil gauge . . . external adjustment of overtravel stop . . . ASA standard bushings . . . which make this the finest breaker in the field.



Power-operated hydraulic tank lifter.



Pneu-Draulic operator.

For complete details, call your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Pneu-Draulic and *Turbo-Ruptor* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-5417

editorial views

Who Pays and How Much

A PROMINENT industry speaker recently stated that the lack of economic incentives may push back the date when atomic power plants are commercially acceptable. The availability and efficient use of conventional fuels coupled with the spiraling costs of nuclear construction are cited as the reasons why the management of investor-owned companies may have to take a second look before embarking on full-scale atomic projects.

If internal or external political considerations should force the country to embark upon a construction program of full-scale nuclear stations, who is going to bear the cost? If it is done by the investor-owned companies, the extra cost of producing power from the atom has to be borne either by the ratepayer or the stockholder. If the government steps in to do that job, the added cost will come out of the pockets of the taxpayers who are already making a substantial contribution to subsidized federal power programs.

Inasmuch as the country is already adequately supplied with electric power facilities that produce at a much lower cost per kilowatt-hour than can be obtained from the atom, the real need for large-scale atomic power producers appears somewhat nebulous. On the other hand, no one can deny that all-out efforts to push nuclear technology ahead as fast as possible are strictly a No. 1 priority.

Since the Atomic Energy Act of 1954 was passed, American businessmen, particularly those in the electric utility and electrical manufacturing area, have done a remarkable job of pursuing the use of the atom for peaceful purposes on a wide front. As everyone knows, this campaign ranges all the way from research on nuclear fuels through prototype studies of different types of reactors to the actual construction of a number of full-scale power stations. Different groups are attacking the problem in different ways and from different directions. There is still opportunity for additional research work along other avenues of investigation.

Again the question arises, who pays and how much? So far as the investor-owned companies are concerned, it is reported that some of their leaders have suggested an annual contribution of four-tenths of one per cent of operating revenues as a minimum bench mark. Considering that our industry has a considerable stake in the long-term prospects of the atom as a fuel, such a contribution toward research would not be burdensome on the consumer and certainly could be expected to be looked upon with favor by regulatory bodies as a legitimate operating expense. In the long run it probably would be the least costly way of speeding the day when many of the answers concerning nuclear power technology can be written down.

The Rural Scene Changes

RURAL electrification is being given a new look as the result of shifting economic tides of the nation. Fewer men are working on fewer but larger farms and machinery has largely replaced both human and animal labor. Still more significant is the change in the type of rural population. Today there are twice as many nonfarm households in the rural area as there are farm operations. This results partially from a decentralization of industry into the rural areas and partially from the flight of households from urban areas to the suburban and rural scene.

There is no indication that these trends will not continue and this makes it imperative that the people, as a whole, take a look at the whole rural electrification program. Rural electric cooperatives in the past 20 years have done a good job in bringing electric power to those areas

beyond the economic reach of investor-owned systems. Today essentially every household in America is within the reach of an electric distribution line. Thus, the initial purpose of REA has been fulfilled.

The question before the people now is: Should the nation continue to loan money that costs them 4% to cooperatives which, by law, are only required to pay 2% for its use? David A. Hamil, REA administrator, has publicly estimated that a need of a billion dollars of new capital per year is not an unreasonable estimate of the money required to finance the expansion of existing electric cooperatives. National out-of-pocket interest charges on this sum would be $20,000,000 annually. It seems to be a little bit unreasonable to ask the nation as a whole to foot the bill for the expansion of electric power facilities in certain areas that are rapidly becoming indistinguishable from any other parts of the country. This appears to be particularly true because the new facilities thus produced yield tax revenue neither to the federal government nor to the state or local treasuries.

Perhaps it's time to ask Congress to review the REA Act to the end that established electric cooperatives be required to obtain capital for future expansion in a manner more in consonance with the realities of the times.

Medallion Homes

IF YOU should see a gold medallion permanently affixed to a new home sometime in the near future don't be surprised. Rather every member of the electrical industry should be pleased that another step is being taken to emphasize the value of living better electrically.

The industry is embarking on a new promotional program involving an identification symbol for new homes that are equipped for full electrical living through the installation of Housepower wiring, basic electrical appliance requirements and approved light conditioning. This new program, the "Live Better . . . Electrically Medallion Home Program," is expected to establish a nationally recognized symbol that will make future home purchasers refuse to accept anything less than a medallion house. A successful promotion of this type will be a long step forward in raising living standards for the customers and in keeping the industry in a competitive position for its share of the consumer dollar.

REGULATORY agencies are not to substitute their judgment for that of management. This is a sound principle. But the very fact that we are not charged with responsibility of management emphasizes the proposition that our job as regulators is to safeguard the public's interest in utility matters. . . .

It is a foregone conclusion that a utility company must at all times be permitted sufficient earnings to maintain itself in a strong financial position so that it can attract the capital necessary to meet its service demands. We know these demands in recent years have been substantially heavy and our utility companies have done a remarkable job in meeting them, which in turn means that regulation has for the most part been fair to those companies we regulate, also, too, in authorizing the earnings that have permitted them to develop and to keep in step with our rapidly expanding economy.—Fred G. Manary, member, Public Utilities Commission of the Territory of Hawaii, before the sixth PCEA Hawaiian conference, Honolulu.

How General Electric engineers used Maine tides to help deliver 94-ton stator to coastal island

Intensive planning with Central Maine Power achieved safe, on-time delivery at new Yarmouth Station

TIDE WAS PUT TO WORK at Portland, Maine harbor to move pontoon barge close as possible to stator of 44,000-kw generator which had been shipped by rail from G-E plant at Lynn, Mass. Installation engineers waited for next high tide to float barge into Casco Bay, ready to start 8-mile trip.

LOW BRIDGE posed problem for 12-foot-high, 188,000-lb stator. As planned by G-E and utility engineers, the wait for low tide provided the necessary clearance and barge continued on voyage.

ISLAND LANDING was timed for high tide so that stator could be grounded as close as possible to specially built I-beam trailer which was to carry it on 1½-mile trip over Cousins Island.

18-FOOT-HIGH BANK had previously been bulldozed and planking put in place so trailer carrying stator could be moved.

TIGHT SQUEEZE had been anticipated by engineers for loaded trailer moved into Central Maine Power's new station with only 1-inch clearance on top.

The foresight and planning applied to this shipment is typical of the know-how which General Electric Installation & Service Engineering (I&SE) brings to each job. The unusual is routine to these G-E specialists who back up quality apparatus with the highest proficiency in installation and service engineering. Your General Electric Apparatus Sales Office will give you complete details on how any one of the 84 I&SE offices throughout the country can assist you. General Electric Company, Section 301-371, Schenectady 5, New York.

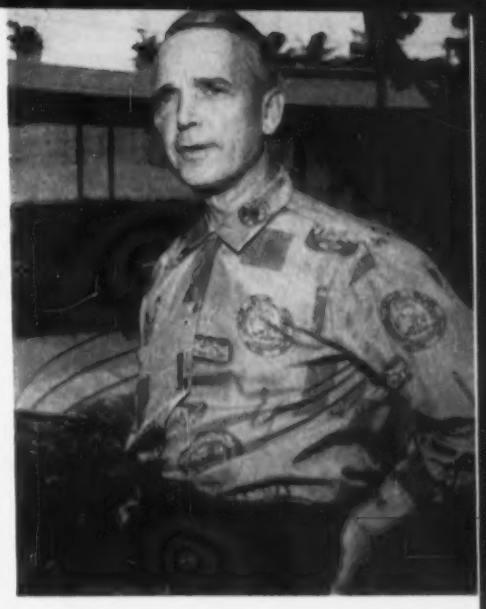
MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST

VOL. 119, NO. 7
DECEMBER 1957

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.



Westinghouse's chief executive predicts burgeoning growth for Western electrical industry in telling PCEA Hawaiian conference about a . . .

$1 Billion Ticket to the Future

Gwilym A. Price, Chairman and President, Westinghouse Electric Corp.

It has been suggested that, as my own contribution to this conference, I should "give a picture through the eyes of an electrical manufacturer of the tremendous future before us, and mention some of the new developments which we can expect." While this subject should be of interest to everyone, predicting the future is a dangerous assignment, and it is especially so in 1957.

Massive Western Expansion

A few months ago Louis N. Ridenour, the California physicist, businessman and teacher, met Clifford C. Furnas at a convention of scientists. You will remember that Dr. Furnas headed the nation's missile development program for several years and that back in 1936 he wrote a best-selling book of prophecy entitled, *"The Next Hundred Years."* The book appeared more than one-fifth of a century ago, and so Ridenour took the occasion to ask, "Well, Doctor, how has it all turned out?" And Dr. Furnas replied, "Everything has happened much *faster* than we expected." The doctor will find a sympathetic friend in any business man who has peered intently into the future . . . carefully studied the needs and resources of the market with the help of the best brains in the country . . . reached a considered decision . . . drawn up a five-year plan . . . and within a year has raised it by 20%.

Everything has indeed happened faster than expected—and it has happened faster and bigger in the West than anywhere else. The statistics of your growth are astonishing, even for an area which many of our friends call "The Land of Golden Horizons." Since the war there has been a major shift of capital to the West. Industry has been investing in new capital goods at a rate considerably above that of the rest of the country. The population of your largest state has doubled since 1940.

The West depends less and less today on the East for its consumer goods, and is shipping less of its raw materials east to be sold in a buyer's market. There has been a massive expansion in manpower, markets, defense installations and a host of manufactures. There has, of course, been an equally massive expansion in facilities for generating electric power. I say "of course" because none of the other developments could possibly have occurred without it, and because Americans have always assumed without question that there will be adequate supplies of electric power available at reasonable rates.

When I examine the annual reports of the nation's electric utilities, I am always struck by the great expansion they unfailingly report, and by the stability of their low rates. The latest report of our host, the Hawaiian Electric Co., is typical of this two-way achievement. We may resent it a little that utility records like this one are taken so much for granted, but perhaps it is really the greatest compliment that could be paid to our industry.

The Spirit of the West

As remarkable as the record of Western industrial expansion has been, I think most non-Westerners are even more impressed with the spirit of the West than with the statistics of its recent growth. A visiting scientist from England described this spirit eloquently in a recent article in *Harpers*. "As I moved westward," he said, "something unexpected happened. Here a new world was developing, self-confident and immensely successful in its own fields. I found the excitement of something I had never seen before: a community fully occupied with the making of its own future." This spirit reflects itself, I think, in a sureness and confidence about the future that may not be felt so strongly in other parts of the country. The Westerner has few questions about how long our present economic upsurge will last or how high it will go. He seems to have few doubts that the rate of economic expansion in these Western states in the next 20 years will exceed even that of the past 10.

1977

Twenty years from now the Pacific Coast Electrical Assn. will be holding a meeting here in Honolulu, and the members will know whether the Westerner of 1957 was right in

his optimism. First, let's look at the population of the United States. It will be somewhere in the neighborhood of 220 million, and almost one-fourth of it—more than 50 million—will be living in the eleven Western states. That compares to one-seventh back in 1957. This redistribution of the population will have caused a major shift in political strength.

The nation's standard of living will be about 50% higher than it was in 1957, though social workers will be deeply disturbed by the shocking statistics which show that only two American houses out of three have a second bathroom. The then recently completed network of limited access highways will extend the present suburban commuting limit of 30 miles to an easy 60 miles. A great many more families will own both a country and a city house. Vocal dialing will be in experimental use in a few telephone exchanges. All naval vessels in service will be atom-powered. Radioactive fission wastes will be the basis of an entire new chemical industry.

Hawaii will have a petroleum refinery and a major new industry for manufacturing paper from sugar cane. It will have one or more steel mills – mills in which the specially treated ore will be fed directly into the steel furnaces without the need for blast furnaces or coke ovens. Hawaii will have two atomic power plants and, since it is in every respect suited for the use of atomic power, all other plants planned or being built will have nuclear reactors. The mainland will be only two hours flying time away, and it will not be uncommon for people here to fly over in the morning for a business or social engagement and back again in the evening in time for dinner. The citizens of Honolulu will be complaining because they haven't a baseball team in the major leagues.

The most striking development in Hawaii, however, will be its new importance as the hub of a tremendously increased trade between the West Coast and the independent nations of the Far East. Those nations will have begun to realize their potential both as incomparable sources of strategic materials and as mass markets. Shipments of steel, aluminum, petroleum products, machinery and other manufactured products to the Far East will be heavy. Britain, Japan and the United States will have very large long-term investments there, and the nations will be undergoing far-reaching, basic developments in power, agriculture, the extra-active industries, manufacturing and transportation.

The demands of the peoples of these Eastern nations for a higher standard of living will still outrun their ability to produce it. But those who rely on profit-and-loss incentives and a free market economy will have gone furthest in obtaining the comforts and necessities they long for. The people who rely on their governments to give them what they want and need, and who resort to nationalized industry as a means of getting it—those people will be suffering the privation and hardship that are and always will be a part of totalitarian systems everywhere.

In 1977 the industrial machine of the United States will be larger and infinitely more complex, and the requirements for managing it will be formidable. About 18% of the nation's manufacturing capacity will be in the eleven Western states. Fully automatic operations will be common in manufacturing establishments throughout the country, and in most cases the value of the equipment will far exceed the value of the plant. A whole new professional class of several hundred thousand engineers and technicians will be spending their full time on the care and feeding of tens of thousands of electronic computers, most of them used in industrial processes.

The nation's electric utility industry will have 75,000,000 customers, 2.2 trillion kwh sales, and an installed generating capacity of 550,000,000 kw. One-fourth of the installed capacity will be in nuclear plants, which will just about equal the total capacity of 1957.

The power industry will be starting still another enormous expansion program, which will double the nation's capacity within 10 years. Price per kwh will still be low, despite much higher operating costs and the continued erosion of the dollar through inflation. This will be possible because great continuing improvements will be made in the electrical apparatus which produces this power. Advocates of socialized power will still be calling for government ownership and control of power facilities in order to produce what they call adequate supplies of power at rates which they consider reasonable.

In 1977 businessmen will be plagued with a number of serious problems. Among these will be a shortage of engineers and scientists, high taxes, low profits despite record sales and adequate incentives for management personnel. A number of manufacturing companies will be in trouble which two years earlier had explained in detail to your power salesmen why they could not afford to modernize.

In the field of home appliances, the world of 1977 will see some of its most striking developments. The homemaker of that year will take electrical living for granted to a degree far beyond our present comprehension. Well over 100 home appliances will be available, more than half of which were not even on the market only 10 years earlier, in 1967. These new and improved appliances will affect our daily living habits and will make our homes more comfortable, more convenient and easier to run.

Residential consumption of electrical power will cross and exceed industrial consumption in 1973. In that historic year, the utilities will bill the average household around 7,700 kwh a year at an annual price of around $190.

If we enter the typical modern home of 1977, here are some of the things we may expect to find.

The house will be equipped with heat pumps which will heat the house in winter and cool it in summer with a single thermostatic control that will turn on the heating or cooling as needed. With the heat pump, the householder will not bother to lay gas lines, and he will not build a chimney unless he intends to burn wood in an open fireplace. Some utility statistician will figure that when all these units are in operation on a hot day, they will be consuming more electric power than the entire nation could provide in 1957.

Dusting in the house will be done by an electrostatic cleaning wand. You will simply wave the wand over a dusty floor, table or other surface, and all the dust within a certain number of feet will be attracted to it electrostatically. When the wand is loaded, you will wash it off in the sink.

The house will have an entertainment center containing hi-fi set, color television in three dimensions, tape recorder and motion picture projector. Television will be shown on a thin, flat screen resembling a picture frame, which will hang from the wall of every room. Programs from all channels will be picked up in the central receiving unit, and you will be able to select any channel from any room simply by pressing a button in a small boxlike cabinet.

Bedrooms will have complete pre-

packaged units providing, on one side, conventional hanging storage for suits and dresses and, on the other side, a Laundro-closet. When you take off your suit or dress and hang it up, the moving tracks will carry it into the wash chamber, then the rinse chamber, then the dry chamber. From there it will be returned, within minutes, to the rack in the hanging closet, clean and ready to wear. Our clothes will be washed without agitation and tumbling. The dirt will be removed by ultrasonic energy—that is, by inaudible sound waves.

The custom kitchen will be organized quite differently from that of today. It will be built around four units: for mixing, for vegetables, for cooking and for prepared foods. Each of these units will have drawers for refrigerated storage, on the principle that the function of the present-day refrigerator will be distributed among the various centers where its services are actually required. The drawers will have no moving parts, the refrigeration being provided by a new application of the Peltier Effect. The basis of the phenomenon is this. If you weld together two wires of different metals and pass an electric current through them, the junction will get hot. But when the current flows in the opposite direction, the junction gets cold. Multiply this effect sufficiently and you have refrigeration without any motor or compressor.

Automatic Meals in '77

The vegetable unit will be at the self-cleaning sink, which will have water dispensers with their own temperature selector. By setting the dial, you will be able to get boiling water for coffee, tea, consomme, and a vast new group of foods which will be precooked and need only boiling water for table preparation. The waste disposer below the sink will incinerate substantial quantities of combustible materials, such as food, paper and cartons, without odor, smoke or ash.

The custom cooking unit will have a series of specialized cooking devices, all clock-controlled and with outlets and retractable cords for connecting them. There will be provision for cooking in pots on electronically controlled flush surface units. Above the counter will be a catalytic action smoke remover.

In the prepared food unit, food packages will be stored in classified racks in a freezer that rests below four ovens. In the morning, you will set the time at which you want to eat. From the schedule of foods in the freezer you will select the items, up to four, you will want at that meal. You push the appropriate selector buttons, and that's all. At the proper time, each selected package of food will be moved from the storage rack and lifted to the appropriate oven, so that it will be cooked and ready to use at the hour selected on the timer. If your taste is for clam chowder, roast beef hash, broccoli and peach pie, you can have them all ready at 6 p.m., automatically.

You will also have a serving buffet, which will combine a number of functions. It will refrigerate food and beverages, warm rolls and plates, dispense liquids, hold serving equipment and dispose of food wastes. When you return a plate or glass to its storage place, it will be automatically cleaned and ready for use in a few minutes.

Now, some of the new products and innovations I have discussed are closer to reality than others. Some are almost here and some, on the other hand, have been described with a pretty strong dash of imagination. But most of them, our engineers tell me, will be introduced into common, everyday use sometime between now and 1977.

You may have noticed that I have not touched on lighting. There are new developments here, too, which I should like to tell you about. We are developing a totally new light source, and we propose to use it in such a way as to give new dimension to light itself. Light will be used as decoration. It will be used architecturally. This development is somewhat closer at hand than some of the others I have discussed. It is now being developed for commercial use in the Westinghouse laboratories at Bloomfield, N. J., under our trade name of Rayescent lighting.

Research is Key to Future

The key to all developments such as these — the key to the future — is a comparatively new factor in our economy. It is called research and development. American industry — American private enterprise—has invested unheard-of sums of money in research since 1950—more money, in fact, than in all the previous years of American history. It is spending $7 billion this year—20% more than in 1956. In 1960 it will probably be spending $9 billion. No nation has ever before made such an incredible investment in the systematic application of scientific knowledge to its industrial problems.

The electrical industry is a leader in this mighty technical effort. The scale of our technical effort today far exceeds that of any other American industry except aircraft. Electrical manufacturers, either for their own projects or contract projects, are spending about 6% of their sales income on research and development programs. That amounts to about one-fifth of all the money that American industry is spending in that field today.

Westinghouse Electric alone is putting $150,000,000 a year into research in the effort to push back the frontiers of human knowledge. We have large staffs that devote their whole time to no other subject than developing new products of the kind I have described today. We have even larger staffs at work on the engineering, research and development of new and better apparatus for the production, transmission and distribution of electric power itself. And our work is typical of that carried on by the other major electrical manufacturers.

The fruits of industrial research take many years to mature. The nation is only now, for instance, realizing the great benefits of discoveries made in the 1920s and 1930s. This means that the great results of all our technical effort of these years will be felt as far ahead as 10 and 20 years. It means that there is a tremendous backlog of important new principles and theories, new products and processes, building up in our laboratories, in our plants and mills and offices.

I am convinced that the greatest technological innovations and inventions of our time lie ahead of us, and that these will burst upon us in the years ahead with a profound and lasting effect. I believe that our descendants may look upon this third quarter of the twentieth century as a turning point in history—as an era in which man rose to a new plateau in his long effort to create a better, more productive, more spacious industrial society.

And this is why I believe that your Westerner, your Hawaiian Islander, your American is right when he looks with confidence and sureness to the future — when he believes that our great contributions to world society lie ahead of us. Charles Kettering, of General Motors fame, aptly summed it up when he said, last year—the 80th of his life: "You will always underrate the future. With willing hands and open minds, the future will be greater than the most fantastic story you can write."

All service calls come to this department, location record is pulled and handling begins with conversation with customer

Punched card master file gives

Quick Close-Out and Service

Better and faster control of service operations and issuing of final bills for customers disconnecting service has resulted from creation of a master service location record on punched cards at the Public Service Co. of New Mexico.

As New Mexico PSC has applied its IBM equipment which, of course, serves a number of other functions in the company's accounting, it virtually eliminates the possibility of duplications or clerical errors in issuing service orders.

The system at PSC is basically a card file set up according to service location. A card representing each meter in the system is used to accumulate a service history.

By using IBM cards for service location masters, hand posting or transcription in the processing of service orders is almost entirely eliminated. Customer and meter identification—which accounts for the great bulk of the clerical work under conventional service order processing methods—is handled by the IBM machines, greatly reducing the possibility of clerical error.

The matter of expediting and controlling service orders is of particular importance in the case of the Public Service Co. of New Mexico because of the nature of the population it serves. The area involved is the hub of the nation's atomic energy development. The company services some 90,000 meters in Albuquerque, Santa Fe, Belen, Las Vegas and Deming. About 10,000 of these meters are for water service in Santa Fe and Las Vegas. The rest are for electricity. Some 64,000 meters—by far the bulk of the firm's service facilities—provide electric service in and around Albuquerque.

In this area, there is an unusually rapid turnover of government and military personnel. In Albuquerque alone, for example, change orders run to an average of 4,200 a month, for an average turnover of a thumping 6.7% per month.

Every one of these requests, today, is routed through PSC's master service location record section, which serves as a central clearing house for all inquiries or requests regarding service changes.

All the information needed to service any account is punched into and printed on a single IBM card. Information on each card includes the full customer address and a complete description of the meter. There are also spaces ruled on each card for up to eight handwritten entries covering the name of the customer presently using service at the address, and columns ruled for insertion of the date service was ordered for each customer, when it was turned on, when the discontinuance was ordered, when the meter was cut off, and the like.

These cards are kept in a series of tub files interspersed with telephone jack stations. In this way, the clerks who work at these files can wear headsets and plug in at the point most convenient for handling the current request. Having the information within fingertip reach makes it possible to locate quickly the great bulk of the records and to answer virtually all questions during the customer's initial call. This was rarely feasible under the former, decentralized methods.

Information is punched into the master service location card and then transmitted directly to men in field by two-way radio

When a call comes in from a customer today, the clerk handling it requests the address and immediately goes to the proper section of tub files. There is no need for her to make written entries at all. She merely pulls the proper location card and verifies the address with the customer.

If the request is a connect order, she enters the customer's name (verifying the spelling) and other instructions in proper columns. If service is to be discontinued, the clerk verifies the customer's name as presently entered on the card and enters the new service instructions. At any rate, the entire transaction is completed, including verification of the utility's records, with the one phone call.

After the customer has hung up, the clerk fills out one of the five different types of blank IBM cards that will serve as the work order for the desired service and the necessary accounting for it. Depending on the request, the clerk can pull any of five cards:

1. New service authorization to install a meter at a location that had not had PSC service previously.
2. Cut in authorization to connect and read an existing meter in establishing service for a new customer at an existing location.
3. Cut out order to disconnect the meter for a customer who is discontinuing service.
4. Read only (for an immediate transfer without interruption of service) a request for a final reading on one account and an opening reading on another.
5. Remove authorization for removal of a meter from a location that will no longer require service.

For the most part, the information to be entered on these card forms is the same. To establish beyond a doubt what service is to be performed, the function of each card is printed in large type right on its face. Also, differently colored, printed stripes are used on each type of card. This color coding serves as immediate identification to assure the right job is done on each meter.

All the clerk has to enter, once she has selected the right card, is the name of the customer and the date service was requested. If the customer requests the change be made on a date other than when he calls, this is also entered.

Next, the work order card is taken, together with the master service location card, to an IBM card punch. The master card is placed in the punch's reading unit, while the work order card is run through the punching station. In this way, all information from the master is automatically sensed and punched into the working card. The punched codes in the working card are then automatically interpreted, clearly printing all data needed by the service man, with no possibilities for errors in transcription.

Meter reading information goes on card

The filled-in IBM working cards are then sent within minutes after the customer calls to a radio dispatcher stationed in the same office. She contacts the proper unit of PSC's five-truck service fleet, relaying all data necessary to complete the job. Under this plan, even "nonrush" calls can be fulfilled within a few hours. On rush orders, a service man is often on the spot in a half hour.

Where service is requested for a specified future date, the work cards are placed in a pending file in order of date. They are then picked up by the dispatcher on the proper day.

In the meantime, the master location card for an account on which service is pending is placed in an open suspense file. Absence of any card from the master file indicates to the clerks that service is already pending on this location. This provides automatic elimination of the duplication of orders, once a major headache.

After a work order has been relayed to a driver via two-way radio, the corresponding IBM card is placed in a routing box where it will be picked up by a messenger and taken to the warehouse to which the drivers report at the end of the day. The drivers pick up these cards and insert information covering service performed, meter reading figures and their signatures as certificates of accuracy.

By the first thing the following morning, a messenger has returned

all of the previous day's work cards to the machine accounting department.

There, they are used to pull the master location cards out of the suspense file. Information is posted on the master card to indicate work performed and it is returned to the file. The cutoff cards are used to initiate final billing. Clerks pull any accounts receivable IBM cards for the customer. These, together with the billing cards and the final reading contained on the work card, provide all the information needed for a typist quickly to prepare a final bill. These, on the average, are in the mail within half a working day after the actual closing reading of the meter.

Except for a single-line entry on the master location card, the office processing of service orders is now completely automatic. Furthermore, the use of IBM cards to make up the master service record makes possible an almost foolproof series of checks and balances all along the way.

To start with, the clerk taking a call verifies meter identification with the customer. There is no writing or copying at this stage—just a verification of the information on the master card. A few simple entries on the type of service and date of service take care of both bringing the master card up to date and initiating a working card for the service man. Most of the transcription needed to create the equivalent of a service order is done automatically by the IBM punch.

As a final touch, sending the cards out to the shop for the servicemen to make their own entries, plus signing them for verification, serves as a further guarantee of accuracy and assurance of efficiency in the office routines.

Because the service data is already on IBM cards, it is immediately and more accurately compatible with other accounting applications such as billing. Billing operations, of course, account for the bulk of the work done on IBM equipment.

In cases other than cutoffs, card punch operators can duplicate most of the information on the work cards which fit right into the routine billing cycle.

Even on cutoffs, it has been projected that automation will take over in the writing of final bills. As this is written, the company has a higher speed, more flexible IBM 407 accounting machine on order. When this arrives, it is expected that the name and address, accounts receivable and previous billing cards that must be gathered in closing out an account can be used to write the final bill itself. All that would be necessary would be the punching of a card to incorporate final billing sums.

Routine IBM billing at PSC is done by the mark sense reading method. Under this program, of course, meter readers merely indicate current readings with pencil strokes, which in turn are converted to punched codes on special IBM reproducing punches. The figure work for routine billing is done on an IBM 604 calculator, which computes usage, applies the proper rates and fully extends the bills. Punched card bills for post card mailing are written on IBM 403 accounting machines equipped with bill feed mechanisms. The IBM bills serve, in turn, to make customer accounting self-perpetuating. The 21-column stubs returned by the customers with their payments can be automatically reproduced into full IBM cards. These, of course, can be sequenced at high speeds on sorters and used on collators automatically to pull accounts receivable cards for cash crediting.

Final bill comes out in half working day

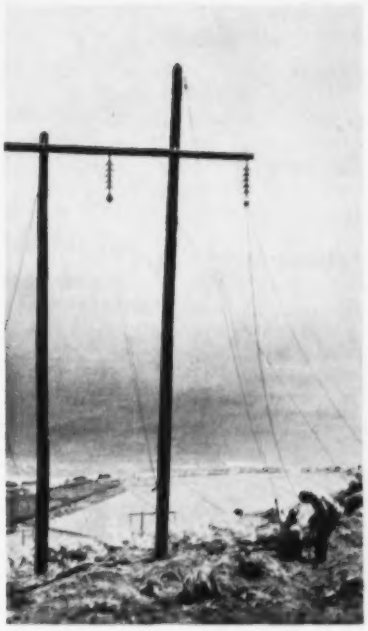
The same machines make it possible to pull cards automatically for the writing of past due notices and for other collection followup work.

It is almost automatic, also, for PSC to use its IBM machines to prepare cash receipts journals, aged trial balances on accounts receivable and other basic management accounting documents.

Due partly to its sudden growth, New Mexico is one of the newer users of IBM equipment among Western electric utilities. Use of the equipment was inaugurated there in 1953.

Under these circumstances, it proved convenient for the firm to combine the installation of IBM equipment with the setting up of its first central service location record. The fortunate timing in this case led to some important new and creative thinking in the setting up and handling of central service location records. Almost overnight, New Mexico was able to jump from a system for handling service calls that had been outdated by rapid growth into one of the most modern in the industry.

Accounting figurework is done on this IBM 604 calculator in customer accounting



Maui Electic Co.'s new 69-kv line

Washington Water Power pulls in a section of its new 107-mile, 230-kv line

New techniques evident as . . .

Transmission Construction Booms

WWP Builds All-Aluminum Line

The Washington Water Power Co. records indicate that the load in the Lewiston-Clarkston area of the company's two-state service system has been increasing at the rate of 12% a year since 1948.

Two 110-kv transmission lines extending southward from Spokane have served this load for some time but, because of the rapid increase in electrical requirements in the region around the confluence of the Snake and the Clearwater, the Washington Water Power Co. made the decision last year to begin construction of still another line to operate at 230,000 v, which will double the capability of the company to deliver power into the area.

New Ideas

The new line marks several notable innovations for the company.

For the first time in the construction of a transmission line, WWP utilized aerial surveys entirely to plan its route and over-all design.

For the first time in the Northwest, the company is using aluminum conductor without any type of steel reinforcing on a major transmission line. The conductor is 1.3 in. in diameter, weighs 1.19 lb per foot, has a tensile strength of 22,000 lb and is made up of 61 strands of aluminum wire.

The use of wood-pole structures instead of steel limited the maximum tension that can be used in the conductor without exceeding structure strength. Also, it was desirable to keep normal tension low enough to prevent dangerous conductor vibration without the use of dampers. The use of ACSR is primarily for its additional strength and since the additional strength is of no advantage in this case there is considerable saving by omitting the steel.

The 930 structures, which will support the line, will be among the tallest on the company's system, being constructed of cedar and western larch poles ranging in length from 60 to 90 ft. The crossarm of each structure will be a 40-ft western larch pole full-length treated with pentachlorophenol. Each structure is cross braced with 30-ft western larch poles approximately 6 in. in minimum diameter.

Future Tie With PNP

When the Mountain Sheep and Pleasant Valley projects, proposed by the Pacific Northwest Power Co. for the middle reaches of the Snake River, are completed Lewiston will become the major redistribution center for this new energy and power will flow from Lewiston to Spokane over the new line now under construction.

Airlift Replaces Access Roads

A load of steel weighing 3,100 lb is brought into position for dropping at a remote hilltop construction site of a transmission tower. Southern California Edison Co. is using this helicopter at Santa Paula to speed up line construction

The first helicopter airlift of men and materials by a utility company on the West Coast is being tried out by Southern California Edison Co. to speed construction of electrical transmission towers and lines across a 26-mile stretch of rugged mountain country near Santa Paula, Calif.

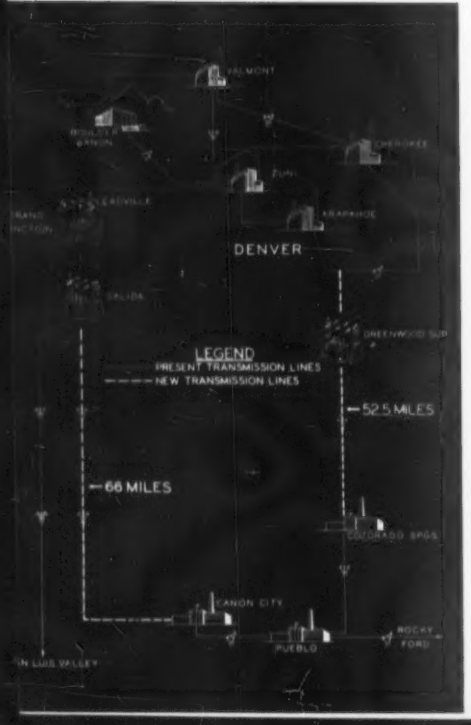
An S-58 Sikorsky whirlybird, one of the largest in use, is demonstrating that it can lift loads up to 4,000 lb and shuttle them to elevations up to 3,000 ft.

If the project is successful it is expected to facilitate the building of transmission lines through rugged, hard-of-access terrain, effecting "substantial savings."

In the operation the S-58 hovers above the ground as initial loads of structural steel and other materials are tied beneath it. The material is then shuttled to the site where it is to be used and the 'copter again remains suspended in the air during unloading. In this way it moves 600 tons of steel in about four weeks.

Based at Ventura airpark, the helicopter is picking up personnel and materials from service points at Santa Paula, Fillmore, Piru and Edison's Santa Clara substation near Saticoy.

Three Colorado Utilities Interconnect—Pool Power



Construction is under way on two new 115,000-v transmission lines forming the final links between major generating utilities in Colorado.

Contracts totaling almost $2,500,000 were signed for construction of the transmission lines between Denver and Colorado Springs and between Canon City and Poncha Junction, five miles west of Salida.

A cooperative arrangement between Public Service Co. of Colorado and Southern Colorado Power Co. to own and operate jointly the new 66-mile transmission line between Canon City and Salida will provide one link in the new power loop connecting six plains and mountain cities.

The second 52.5-mile transmission loop will be jointly owned and operated by Public Service Co. and the Colorado Springs Department of Public Utilities.

The new lines are to be completed before the first of the year.

L. M. Robertson, chief electrical engineer of Public Service Co., said: "When the two new lines are completed, they will make possible an interchange of power between the utilities in time of emergency and will also make for more efficient use of electrical facilities."

Both lines will be carried on H-frame wooden poles. An overhead ground wire will be installed for lightning protection. Both lines will be single circuit.

As a result of the tie-in, Public Service will have dual transmission capacity between its Denver facilities and the Leadville, Salida and Alamosa areas.

One of the big users on the interconnected system will be the U. S. Air Force Academy, under construction north of Colorado Springs.

By the time the lines are completed, Public Service expects to have in operation its new 110,000-kw generator at the Cherokee plant in north Denver and its new 24,000-kw generator at Grand Junction.

Hawaiian Utilities Build 69-KV Lines

Two different electric companies in Hawaii have been busy building transmission lines across difficult and high-level volcanic terrain as a result of consolidation programs fostered by the Territorial Public Utilities Commission.

Both are using aluminum conductors, previously not used to any large extent, in the territory where aluminum now is getting a boost from its relatively new resident, Henry J. Kaiser.

On the island of Hawaii, 99 miles of line are being strung across and around two 13,000-ft volcanoes, Mauna Loa and Mauna Kea, as Hilo Electric Light Co. extends its wires in taking over as the sole electrical utility on that island.

On the island of Maui, some 23 miles of line are being laid across lower but still difficult slopes as Maui Electric Co. extends its power to Lahaina, previously served by the system of Pioneer Mill Co., a large sugar plantation.

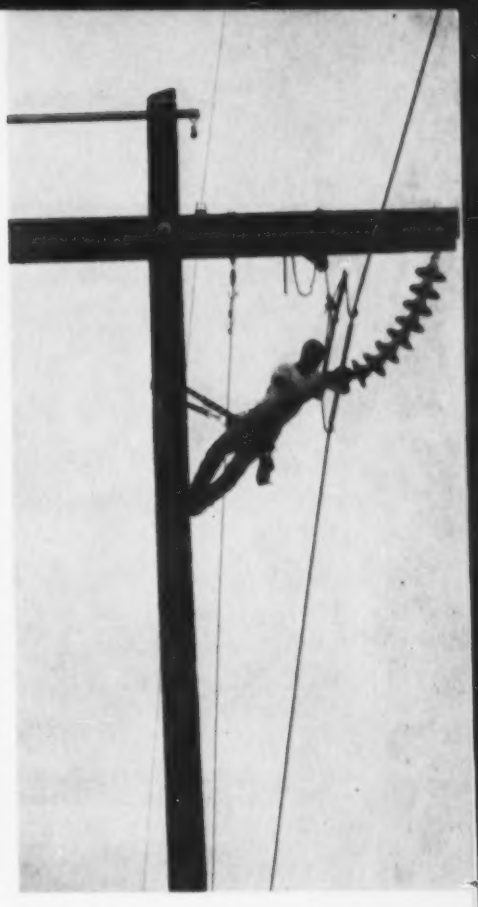
The lines have posed their own particular problem.

Volcanic lava is a particularly difficult material to work with and line crews installing poles must dig extremely large holes to compensate for cave-ins and must provide considerable bracing until backfilling has been completed.

Kite Spans Valley

On the Maui job, workmen at one point built an old box kite, as they had as youngsters, to get a line across one steep ravine.

The tough mountain route was chosen on Maui to connect the new system in preference to an easier coastal route along existing highways for several reasons: (1) salt-laden air along the coast would have required almost constant washing of the insulators; (2) stringing the lines around curves would have been difficult; and (3) the lines would have marred the scenic highway view.



High-line man swings with ease atop one of the 2,009 H-frame towers on PP&L's new Billings to Casper line

PP&L Links Wyoming With NW Pool

Pacific Power & Light Co. recently dedicated a new 161,000-v transmission line that brings many northern Wyoming communities their first main-line power service and provides a link between power networks of the Pacific Northwest and the Rocky Mountain area.

The 251-mile line starts at Casper, in central Wyoming, and cuts north across the state to Billings, Mont.

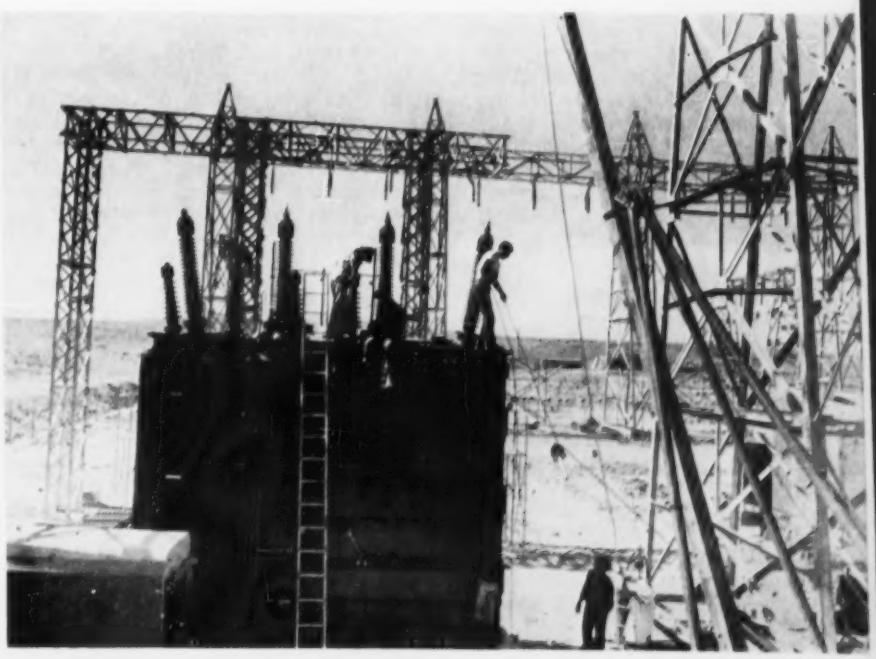
Through interconnections at Casper and at Billings and Yellowtail, Mont., it makes available to northern Wyoming power from the Pacific Northwest Power Pool, U. S. Bureau of Reclamation lines in the Rocky Mountain area and the Montana Power Co. system.

Much of the power generated at the 100,000-kw Dave Johnston steam plant at Glenrock, Wyo.—to be completed next year—will be transmitted to northern Wyoming communities over the new line. And some of it will move westward to other parts of the Northwest pool.

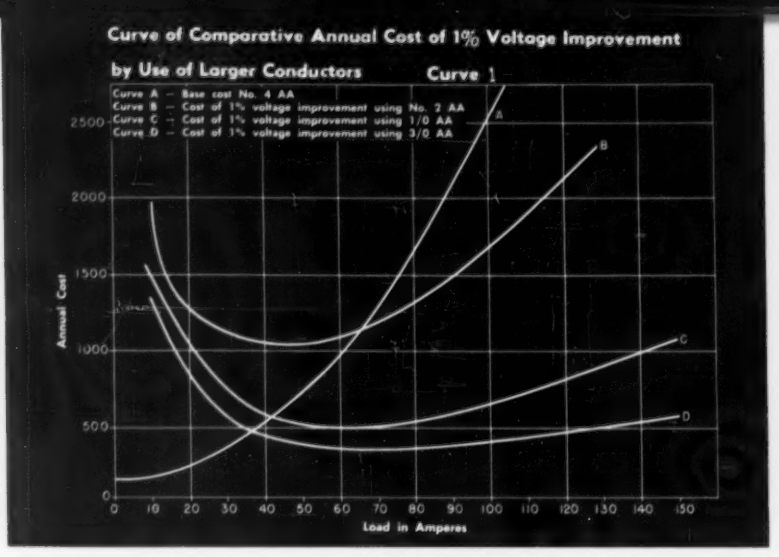
Five substations along the line, with a total transformer capacity of 252,290 kva, will step down the voltage for distribution to local communities.

The Billings-Casper transmission project was built in 16 months, at a cost of $7,200,000.

Five substations totaling 252,290-kva installed transformer capacity are part of the 251-mile line. Working year round, the job took 16 months



Here's how to combine regulators, capacitors and conductor to get the most . . .


Curve of Comparative Annual Cost of 1% Voltage Improvement
by Use of Larger Conductors
Curve 1
Curve A — Base cost No. 4 AA
Curve B — Cost of 1% voltage improvement using No. 2 AA
Curve C — Cost of 1% voltage improvement using 1/0 AA
Curve D — Cost of 1% voltage improvement using 3/0 AA
Annual Cost
2500
2000
1500
1000
500
0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Load in Amperes
A
B
C
D

Economic Voltage Control

M. P. Goudy, Consulting Engineer, Arizona Public Service Co.

Since voltage drop is inherent in any line carrying electrical current, control of this drop presents a problem to utility engineers and executives. The problem is increased since today's customer demands service of a degree far above what would have been considered satisfactory 10 years ago. He demands continuous, flicker-free service at a voltage that provides for operation of his equipment at maximum efficiency. Revenue from many energy-consuming devices varies as some power of voltage. Hence the necessity for providing service at good voltage is *important for both economic and public relations standpoints.*

Proper engineering and management demands that corrections for voltage drop be provided at the minimum cost. Since maximum voltage at the generator or substation bus is limited by the inherent range of the consuming devices on the customer's premises, we shall concern ourselves here with the drop through the system from generator or substation to the consumer's transformers.

Three means are available to reduce or correct excess voltage drop: larger conductor, voltage regulators, capacitors, or some combination of the three. The problem is to select the item by combination—which is the most economical.

Conductor Size

The value of the use of larger conductors in improving voltage conditions usually is not given the recognition it deserves. It is true that the magnitude of voltage improvement possible by using larger conductors is very limited. However, using a larger conductor reduces voltage drop and decreases losses and the value of the decreased losses may justify their use. To determine if use of larger conductors is justified, a small conductor, such as No. 4 all-aluminum, is taken as a base and, plotting the annual cost for 1% voltage improvement against ampere load, curves as in Fig. 1 are obtained. These curves show that, compared with No. 4, No. 2-AA has less cost at 65 amp, 1/0 at 41 amp and 3/0 at 37 amp. Curve No. 2 gives the same data for No. 6 Cu as the base.

The curves show the benefit of using larger conductors as a means of voltage improvement. But, since the gain percentagewise is limited, the use of larger conductors is not the entire answer in practically all cases. Some further treatment is required.

Capacitors and Regulators

The simplest method of correcting poor voltage conditions is the voltage regulator. This device is easily installed and relief is obtained quickly. There is a gain in revenue and a small decrease in losses because of increased voltage, but no major gain in system efficiency.

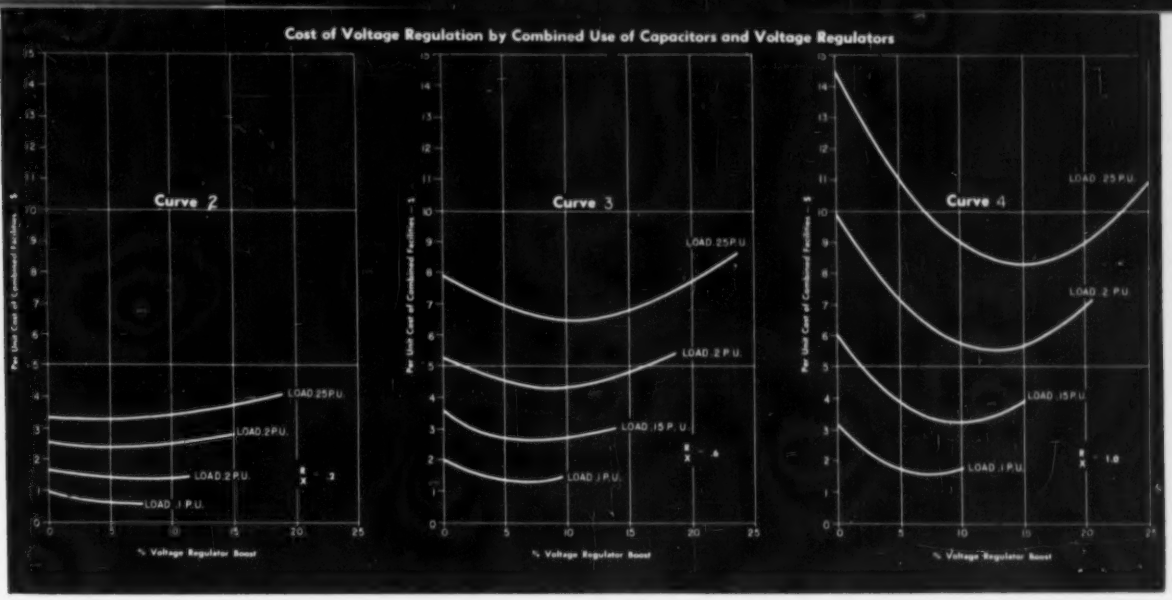
The static shunt capacitor has in recent years become an important device to improve distribution circuit operation and a major benefit is the rise in voltage obtained by its use. There are other gains, such as improved power factor, decreased losses, thermal capacity released in substations, lines, transformers and generators, and an over-all improvement in system efficiency.

The capacitor raises the voltage from its point of installation back to the source while the voltage regulator raises the voltage on the load side of the point of installation. The capacitor, unlike the regulator, cannot lower voltage.

A recent paper, AIEE 54-434 by R. M. Butler and D. M. Samson, develops a method of determining the economic combination of capacitors and regulators. This method depends on using the R/X ratio of the system as a base, and comparing total capital costs for various loads, at varying degrees of regulator boost. In this method, all values used are per unit.

For each condition assumed the exact amount of capacitors or regulator kva for voltage correction is used as the basis for calculating costs. The cost of the equipment required is calculated, the effect of the capacitors on power factor and current and the result of changing current on losses are all combined to produce curves as shown in Figs. 4, 5 and 6. These curves are plotted for varying values of R/X: .2, .6 and 1.0. A study of the curves will disclose (1) the total cost of regulation increases as the R/X value increases and (2) the higher the R/X, the more important is the regulator and the less the value of capacitors.

An item of considerable impor-



tance to the study is this: *the economic point is reached at* 1.0 *pf, therefore sufficient capacitors to bring the peak load pf to* 1.0 *combined with regulators give the economic combination.*

The size of conductor affects the R/X ratio, the larger conductors having a lower ratio.

To demonstrate the combined effect of larger conductors, capacitors and regulators are shown in Figs. 7 and 8. They assume similar conditions except the conductor size is increased from No. 2 to 3/0 with the result that the per-unit total cost is reduced from $6.10 to $3.20. The larger conductor combines with the equipment installed to control the voltage drop at the most economical level.

The conclusions reached as a result of the study on which this article is based are:

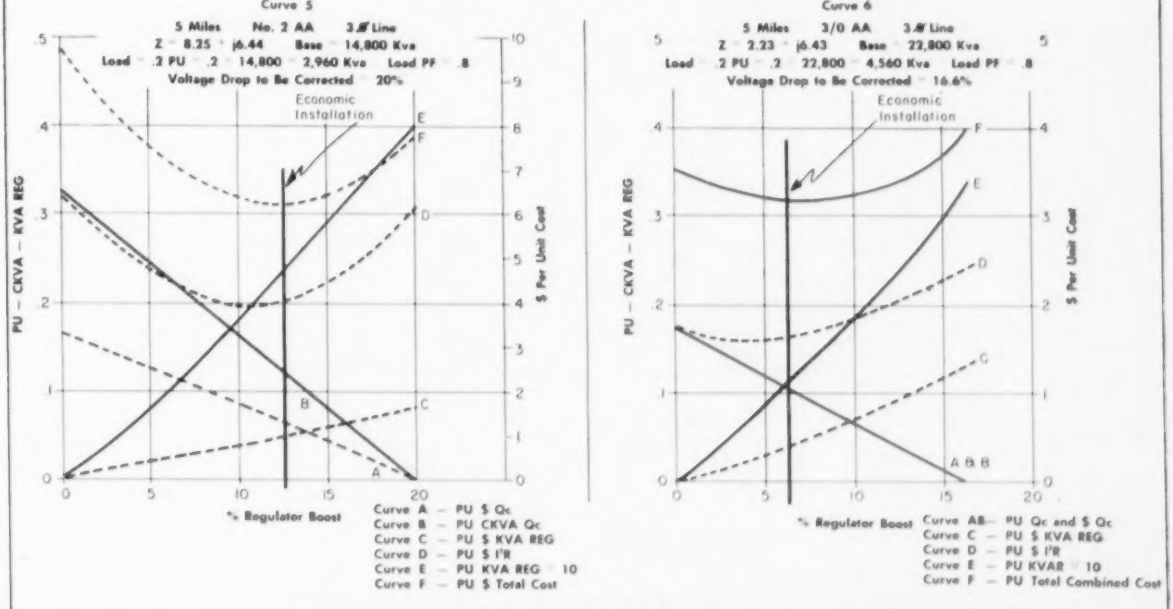
1. The use of larger conductors than has been the practice is justified to improve voltage regulation.
2. The most economical combination is obtained from larger conductors, capacitors and regulators in proper proportions.
3. Sufficient capacitors to bring the power factor to unity, the remaining drop being corrected by regulators, give the most economical combination.

Costs Used in Preparing Curves *

Fixed charges/mile, 3-phase at 16.5%	
No. 4-AA	$158.00
2	187.00
1/0	229.00
3/0	287.00
6 Cu	211.00
4 Cu	272.00
2 Cu	371.00
1/0 Cu	560.00
1 R/kw-yr annual cost	31.50
Capital cost	
Ckva switches	$10/kva
Kva regulator	$40/kva
KwI^2R	$140.00

*Included as an aid in making similar studies—Editor.

Curves of Economic Voltage Regulation


Curve 5
5 Miles No. 2 AA 3Ø Line
Z = 8.25 + j6.44 Base = 14,800 Kva
Load = .2 PU = .2 = 14,800 = 2,960 Kva Load PF = .8
Voltage Drop to Be Corrected = 20%
Economic Installation
PU — CKVA — KVA REG
$ Per Unit Cost
% Regulator Boost
Curve A — PU $ Qc
Curve B — PU CKVA Qc
Curve C — PU $ KVA REG
Curve D — PU $ I²R
Curve E — PU KVA REG ÷ 10
Curve F — PU $ Total Cost
Curve 6
5 Miles 3/0 AA 3Ø Line
Z = 2.23 + j6.43 Base = 22,800 Kva
Load = .2 PU = .2 = 22,800 = 4,560 Kva Load PF = .8
Voltage Drop to Be Corrected = 16.6%
Economic Installation
PU — CKVA — KVA REG
$ Per Unit Cost
% Regulator Boost
Curve AB — PU Qc and $ Qc
Curve C — PU $ KVA REG
Curve D — PU $ I²R
Curve E — PU KVAR ÷ 10
Curve F — PU Total Combined Cost

Economic Installation

	% Regulator Boost	CKVA	$ CKVA	I	PF	Kw Loss	$ Loss Cost	Kva Regulator	$ Cost Regulator	$ Cost Conductor	$ Total Cost
Curve 5	12.5	1,780	17,800	109	1.0	295	56,000	375	15,000	5,150	88,800
Curve 6	5	2,700	27,000	170	1.0	192	36,500	160	6,400	10,802	80,900

Balch power house, central plant on the Kings, expands to accommodate two new units. It will be the only attended plant, controlling Kings and Haas with supervisory

PG and E designs the 261-mva Kings River development for . . .

Central Control

Jess R. Herrera, Electrical Engineer, Pacific Gas and Electric Co.

The Kings River hydroelectric development is currently under construction in the majestic and rugged terrain of the Sierra Nevada Mountain ranges approximately 60 miles east of Fresno. This development will utilize the watershed of the north fork of the Kings River, and will add 261,500 kw of capability to the PG and E system when completed. Included in the complete project are the Courtright and Wishon Dams, and Haas, Balch and Kings River power houses. (See ELECTRICAL WEST, December 1955, p 62, for details of the development.)

Unit Control

The new Balch power house will be the control center and only regularly attended plant in the complete Kings River project. In addition to controlling its two new generating units, Balch will have remote control over both Haas and Kings River power houses, as well as of the existing Balch Unit No. 1. The type of control (remote, local automatic or manual) under which any generating unit will function will be determined by the position of a manually operated transfer switch.

Automatic Starting

An automatic starting sequence will require only a single impulse that will energize the master control relay. This relay will in turn initiate the following principal steps to place the unit into operation:

1. The turbine spiral distributor will fill with water from the penstock to equalize the pressure across the turbine main shut-off valve.
2. The turbine main valve will open.
3. The turbine nozzles will open slightly to set the unit into motion under the control of the governor. As the generator comes up to speed, the generator field current will build up and the generator voltage will be under control of the voltage regulator device.
4. As the unit approaches synchronous speed, a speed matcher relay will operate to "match" the generator frequency to that of the transmission line frequency. It does this by a series of impulses to the governor speed adjusting motor, which in turn causes the turbine nozzles to open or close slightly to obtain the desired speed.
5. When the voltage, frequency and phase angle of the machine are in the proper relationship for synchronizing, an automatic synchronizer device will cause the 220-kv-line circuit breaker to close, connecting the generating unit to the transmission system. If both units are started up in a two-unit plant, such as at Balch or Haas, automatic synchronizing will be accomplished on a preferred unit sequential basis so that first one machine will be connected to the system, followed by the second machine.

Normal starting of the units is predicated on an energized transmission line (from other generating sources) with synchronizing accomplished across a circuit breaker at the power house.

6. After a machine is on the line, the load will be adjusted by manual control of its governor gate limit device either locally at the plant or remotely via supervisory control in the case of Haas and Kings River power houses.

Automatic Stopping

A machine may be stopped by de-energizing the master control relay either locally at the power house or by supervisory control in the case of a remote plant. When the master relay is de-energized, the following principal steps will take place to shut down the unit:

1. The governor will cause the turbine nozzles to start to close and thus unload the machine.
2. When the nozzles reach their no-load position, the unit will be disconnected from the system by tripping the generator or line breaker (depending on the circuitry of the plant involved).
3. The turbine main shut-off valve will start to close, unless restrained by a cutout switch.
4. The field will be removed from the machine and the exciter field rheostat will be motor driven to its no-load position.
5. At approximately 50% of normal speed, an air-operated brake will be applied (first intermittently and then continuously) until the unit is brought to a complete stop.

Protective Devices

To protect the equipment against abnormal conditions that may arise, each of the plants will be provided with a set of protective devices that will cause the generating units to shut down if necessary. Thus all plants will be completely self-protected, even if unattended. In addition, operation of any protective device will operate an annunciator at the plant and will sound an alarm. The alarm from a remote plant will be transmitted to Balch power house via supervisory control.

The protective devices may be classified under the following four main groups:

Nonshut-Down Devices

This group of devices protects against abnormal conditions of a relatively minor nature that do not warrant removing a generating unit from service automatically. Operation of these devices will only actuate an annunciator drop and give an alarm, thus informing the operator of conditions that exist. Examples of nonshut-down devices are: station air compressor low pressure switch, transformer oil pump undervoltage relay and the low oil level switch in the governor sump tank.

Partial Shut-Down Devices

Operation of these devices will cause the generating unit to "separate" from the system by tripping the line or generator breaker. However, the unit will continue running under governor control at the speed-no-load position. This type of shutdown results mainly from transmission line or main transformer faults, which could be of a transient or temporary nature. Examples of these types of faults are: 220-kv line overcurrent and transformer bank overvoltage. The unit will continue running at no-load until either shut down manually or until the transmission line voltage returns to normal, in which case the generating unit will synchronize automatically as described previously to reconnect with the system.

Nonlockout Shut-Down Devices

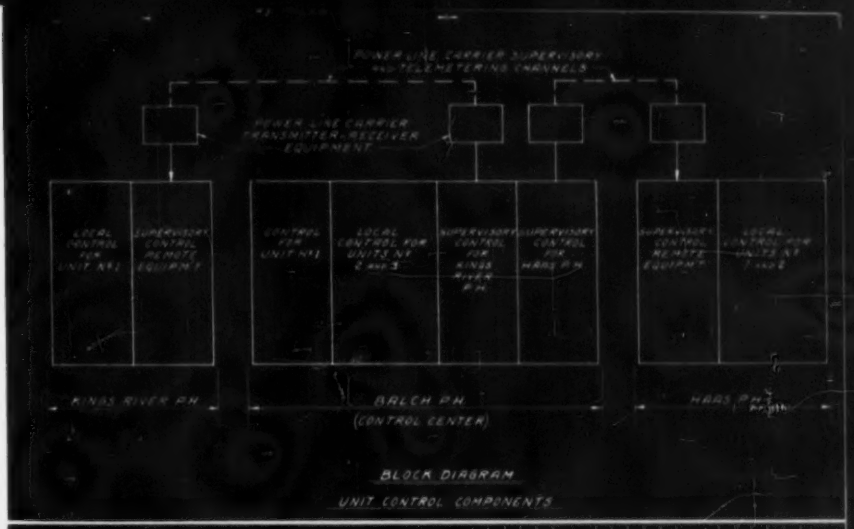
These devices will cause a shutdown because of troubles that are serious enough to warrant removing the load from a machine and stopping it. An example of this is upon operation of the generator winding temperature relay. If the condition that caused the shutdown subsequently clears itself, or is corrected by an operator, the unit is then free to be restarted in a normal manner.

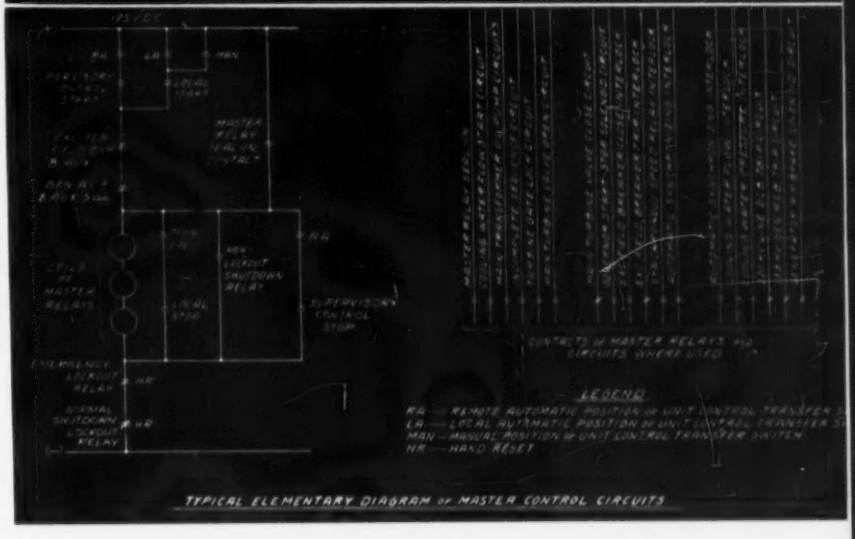
Lockout Shut-Down Devices

These protective devices are operable when troubles of a more serious or emergency nature occur. Some devices in this category will cause the machine to shut down and lock out in a manner as described previously under automatic stopping. An example is operation of the generator bearing temperature switches.

Operation of other devices, resulting from troubles of an emergency nature, will cause the machine to be shut down and locked out as soon as possible. In this case the machine will be disconnected from the system immediately without waiting for the unit to go to its no-load position. An example of this is operation of the generator differential relays.

Occurrence of a lockout shutdown will prevent the unit from being restarted until the trouble is corrected and the lockout relays at the plant are reset by hand.




MASTER RELAY SEALING CONTACT
LOCAL STOP
SUPERVISORY CONTROL STOP
CONTACTS OF MASTER RELAYS AND CIRCUITS WHERE USED
LEGEND
HR — HAND RESET
TYPICAL ELEMENTARY DIAGRAM OF MASTER CONTROL CIRCUITS

Supervisory Control

Remote control of the generating units at Haas and Kings River power houses from Balch power house will be accomplished by supervisory control. The various control, alarm and telemetering functions will be transmitted via power line carrier channels on the 220- and 110-kv lines.

Supervisory control features will be provided to enable the operator at Balch to start and stop a remote unit, to regulate its voltage, and to control its real and reactive power output. Indicating lights on the control panel at Balch will show the position of remote equipment such as circuit breakers and lockout relays. Telemetered information covering loads, voltages, water levels and flows also will be available at Balch power house to assist in the proper operation of the remote units. An alarm will be transmitted to Balch in case of any abnormal condition at the remote plants.

The centralized control of the entire Kings River development should afford operating economies without compromising efficiency.

Lewis Strauss, AEC chairman, throws the switch officially placing Santa Susana generator on the line and causing arc to dance at dedication

In spite of Sputnik . . .

Santa Susana, Vallecitos on Line—

TWO significant bench marks in the development of peacetime atomic power were achieved last month as the Vallecitos developmental atomic power station and the Santa Susana experimental generating plant were formally dedicated.

The Santa Susana plant, which first generated power in July, is distinguished by the fact that it is the first nonmilitary nuclear reactor designed and built exclusively for civilian use to produce electric power for distribution on a commercial basis. Vallecitos, which first began operations Oct. 24, stands as the first privately financed atomic electric power plant. The firsts, nowhere nearly as significant as the accomplishments they represent, certainly bring credit to the Southern California Edison Co., Atomics International and the AEC for their joint work at Santa Susana, and to the Pacific Gas and Electric Co. and General Electric Co. for their collaboration on the Vallecitos project.

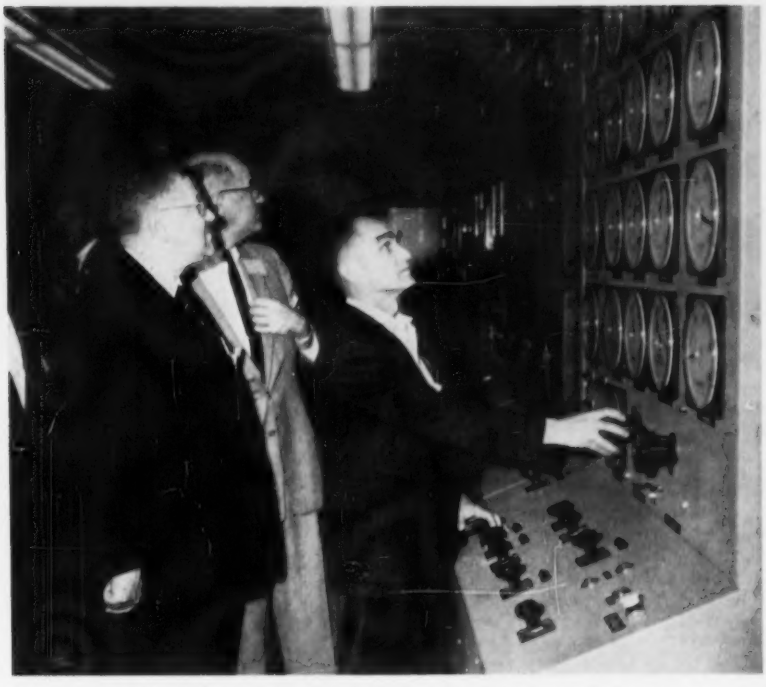
Atomic fuel is loaded into the reactor at the Santa Susana sodium reactor site

Stepping Stones

The effort expended in each of these stations will pave the way to the successful building of still larger installations. Santa Susana technology will be reused and improved upon during the construction of the 75,000-kw sodium graphite nuclear power plant to be built on the system of the Consumers' Public Power District. Similarly, the Vallecitos experience will be applied in the construction of Commonwealth Edison Co.'s 180,000-kw Dresden nuclear power station.

Technical details of the Santa Susana station have been discussed previously (EWEST, November 1956, p. 90) and the Vallecitos station EWEST, May 1956, p. 73).

Equally important as the design is the operating experience to be gained.



PG and E President Norman Sutherland and General Electric's George White, general manager, APED, see Al Woronick, PG and E shift foreman, adjust output

Dedicated

Growing Technology

In the eyes of the utility industry, the most important facet of this dual achievement is the fact that there is now available a growing mass of data regarding the pros and cons of two radically different reactor cycles. The sodium reactor is advantageous in that high pressure in its primary system is eliminated because of the high boiling point of the liquid metal used as a coolant.

Discussing the relative merits of the various reactor cycles AEC's Ken Davis explained a previous statement regarding the concentration on "water reactors." He pointed out that, by applying more money and manpower, it seems possible to exploit the economic potential of these reactors sooner, but that this added effort would not in any way affect the status of work on sodium reactors, since they may possess the greatest long-range power producing potential.

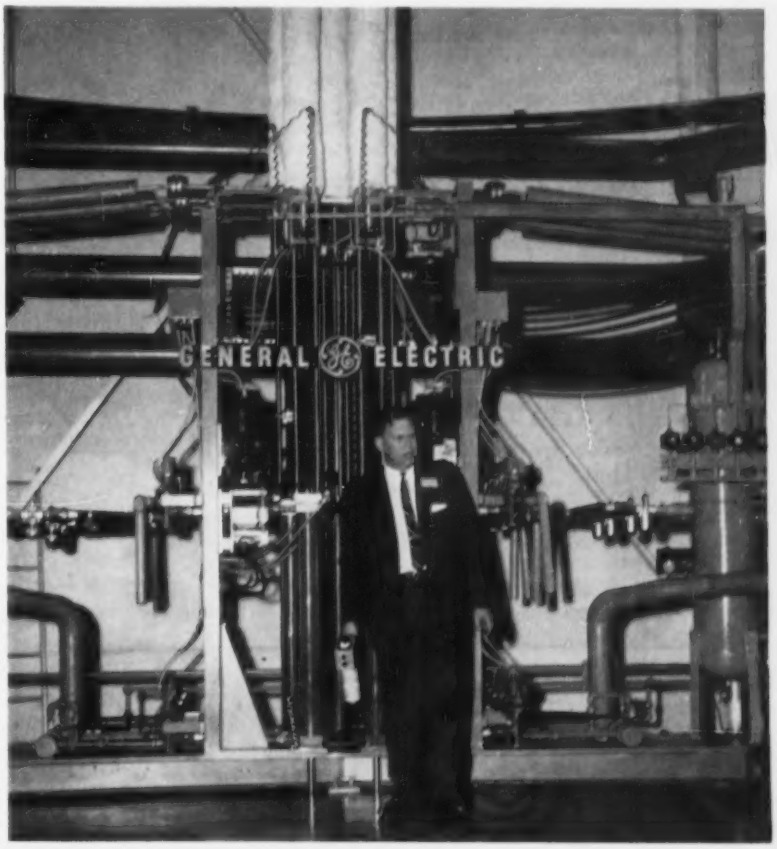
Story of Accomplishment

In the face of continuing hullabaloo, Sputnik inspired, the words of AEC Commissioner Strauss at the Santa Susana dedication are worth remembering.

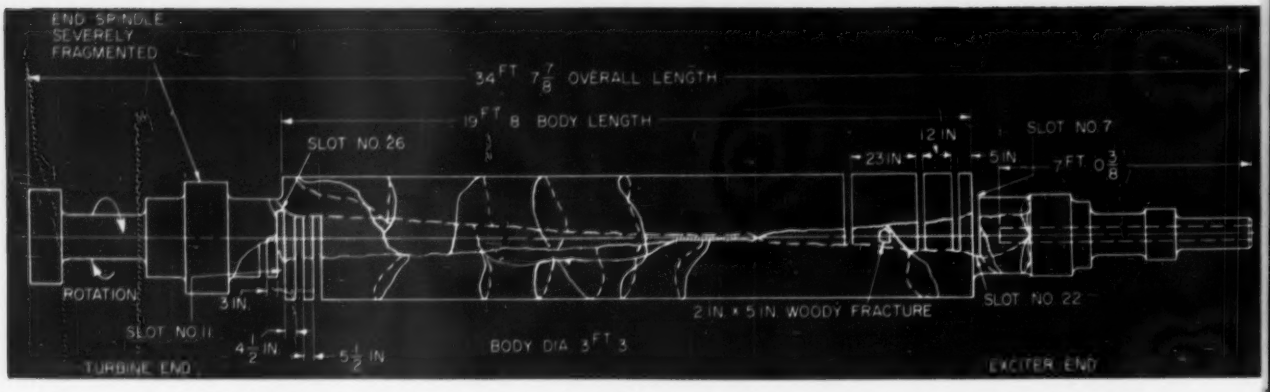
"With today's event, four nuclear power plants have come into operation in the United States during the past 10 months, and are at this moment generating electricity for civilian use.

"By the mid-1960's there are expected to be some 18 or 20 nuclear power plants serving homes and industries across our nation. These plants will represent a total investment of close to a billion dollars, with a large portion of that sum to be supplied by industry itself. In fact, planning or negotiation has already been announced for eight large plants to be financed entirely by private capital."

Managements of the participating utilities, their employees and indeed all of the members of the industry should be proud of the achievements at Vallecitos and Santa Susana.



Sam Untermyer II carried over-all responsibility for design and construction of the Vallecitos plant, pauses in front of the reactor control rod mechanism



Rotor diagram showing fracture center, shaded planar primary fracture surface and transverse secondary fracture lines

Analysis of Pittsburg Rotor Burst

"On March 18, 1956, the generator rotor of the 169,118-kva Pittsburg Unit No. 1 of the Pacific Gas and Electric Co. burst during an overspeed governor trip test. . . . The rotor body burst lengthwise into two half cylinders like a log split down the middle. The two halves then broke into smaller pieces. . . . The origin of the fracture was an area about 5 in. long axially by about 2 in. wide radially." (See diagram and photograph above.)

Tests by the forging manufacturer and the generator manufacturer were carefully re-examined after the failure, yielding the following conclusion: "By sonic test, and by all the standards and experience available, this was judged to be a sound and serviceable forging."

Metallurgical study of the fracture surfaced indicated "that most of this surface existed in the forging when it was received in our factory."

Clues From No. 3 Rotor

"The difference between the size of the discontinuity in the rotor deduced from macro and micro study of the 2 in. by 5 in. area, as compared to that indicated by the sonic test, appears to be resolved recently by the results of an investigation of another generator rotor after about two years' service in the Unit No. 3 at Pittsburg station."

Comparison of sonic tests before and after two years' service in the No. 3 rotor revealed a marked increase in sonic indication. "This was the first time that we had found a change in the sonic test results after a rotor was run, and we had retested 17 rotors after they had been in service."

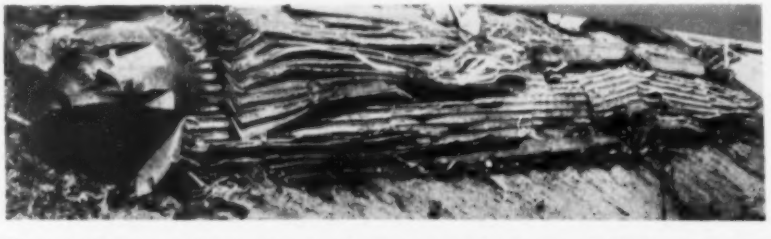
Conclusions

Painstaking metallurgical examination from that section of the Pittsburgh No. 3 rotor which had an increase in sonic indication, showed an inclusion "found to be bonded to the metal in some places and not in others. . . . From the foregoing similarities between Pittsburg No. 1 and No. 3, we conclude that a plane of inclusions existed in No. 1 like that observed in No. 3. An inclusion array of such size, shape and low strength undoubtedly causes a severe stress concentration in the metal around the edges of the inclusion area, and it appears likely, from the results of bursting tests of large disks containing cracks, or notches at center bore holes, that such an inclusion array was the primary cause of the No. 1 rotor burst. . . . **Why did the sonic test before service given no indication of anything nearly as large as this inclusion?**" . . . we are accumulating evidence that thin nonmetallic inclusions if well bonded to the metal may transmit sonic waves quite effectively even though they cover relatively large planar areas so that the reflections from them as observed on the sonic test oscilloscope are considerably less than those coming from thick inclusions or thin cracks much smaller in area."

These are abstracted statements from ASME paper 57-PWR-12 prepared by Messrs. DeForest, Schabtach, Grobel and Seguin of the General Electric Co. large steam turbine generator department.

Circled 2x5-in. fracture origin area

Why did No. 1 rotor burst when No. 3 did not? It is probably significant that the inclusion size in No. 1 was somewhat larger than No. 3, and that there was a somewhat tougher metallurgical structure surrounding the No. 3inclusion. Also a difference in transition temperatures indicates increased bursting strength in No. 3. Finally, No. 3 was prewarmed. One, or a combination, of these factors prevented the No. 3 rotor from bursting.



View of Pittsburg No. 1 rotor burst after removal of upper half of stator, core

Teamwork and progress provided the theme for an outstanding program at the . . .

Sixth PCEA Hawaiian Conference

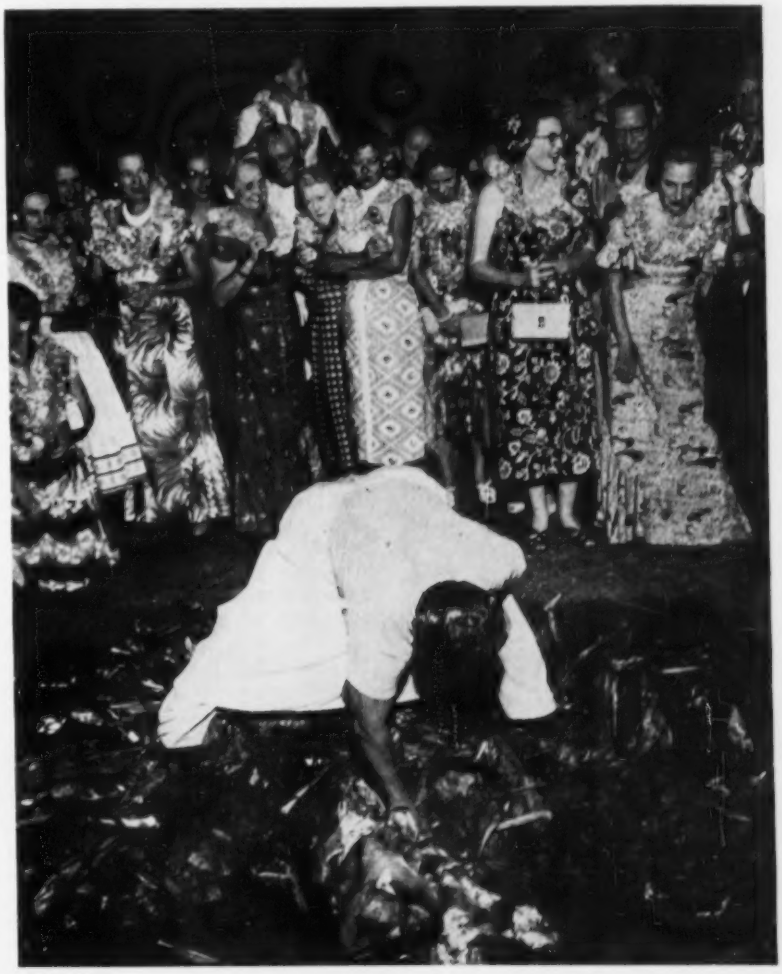
Conference Hosts—Mr. and Mrs. L. A. Hicks, Mr. and Mrs. Harry Field, HECO

Traditional island hospitality, a well-planned program and a generous sprinkling of industry representatives from the mainland proved to be a recipe for one of the best Pacific Coast Electrical Assn. meetings held in recent years. Interest in the meeting was evidenced by a very large attendance representing a cross section of the electrical industry in the Hawaiian Island group. The program reflected the great strides that are being made electrically in the islands as well as stressing the need for sound cooperative area development activities in the territory.

Leslie A. Hicks, president of the host company, The Hawaiian Electric Co., keynoted the conference by describing both the strong economic position of the islands and the rapid electrical growth that has characterized the expansion. For example, on Oahu approximately 9,000 new homes will be completed in 1956 and 1957 and well over 80% of these are all electric. Commercial power has increased at a rate of 26%.

In commenting on the electrical promotional activities, he pointed out that the United States has been using its scientific brains and efforts for the improvement of living conditions in our country and for the less fortunate people of the world while the Communists have been using scientific achievement for propaganda purposes. He stated that, while we are not going to give up our program because of the Communist threat, it will be necessary to make an increased effort to protect ourselves on the one hand, while we continue to advance in our main purpose on the other.

Commercial atomic power may not be as near as many people think.

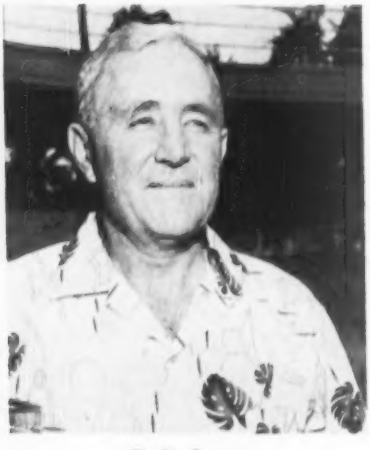


As guests of Hawaiian Electric, mainland guests watch traditional luau ceremony

Larry Walker
General Electric

E. A. Vennard
Edison Electric Institute

Vic Hartley
PCEA



R. R. Lyons
Maui Electric

Merrill Skinner
Union Electric

This was the statement of Paul Hallingby Jr., vice-president of Middle South Utilities Inc., who told the convention that the near-term economic incentives in developing atomic power clearly are lacking. On the other hand, the long-term incentives are very attractive. Achievement of the latter goal should be based on the qualitative standard of sound tchnological advancement rather than on the quantitative standard of kilowatts of atomic power. Although he indicated that there are many people who have been stampeded into an "international kilowatt race," he indicated that the country's present program of research and development of different types of experimental reactors eventually would prove to be both the most expeditious and economical way of making the atom competitive with conventional fuels.

Three phases of area development were discussed by C. W. Leihy, editor of ELECTRICAL WEST; Walter T. Lucking, president of the Arizona Public Service Co.; and C. C. Walker, vice-president of the General Electric Co. Leihy described the broad aspects of area development, particularly as it is applied to island communities. He pointed out that extremely careful planning is necessary to insure that future land use by industry would neither affect living conditions nor detract from the natural beauty of Hawaii. He also pointed out that the utility, because it is inextricably tied to the area, should take the leadership in developing the cooperation and teamwork of other interested agencies in effecting sound growth and orderly economic progress.

Walter Lucking described in detail how a utility can improve its community relations. Stating that every successful community relations program begins with the employees of the company, he urged that employees be fully informed on company operations, policies and plans. Then through the employees and every other medium of communication available, the community should be provided with the information necessary for people to understand the company's operations and its problems. Company officers and employees also should take leading roles in all types of civic projects and be willing to lend assistance to the solution of every type of civic problem. Even more basic than the problem of community relations is the responsibility of the utility companies to show by example and to tell on every occasion the story of the free enterprise competitive system through which the people have been able to enjoy an ever-increasing standard of living.

"How to Build a Better Business Climate" was the subject of Walker's address. He stated that a good business climate is necessary to attract the companies that will provide the new jobs needed to meet growth in population and to insure economic progress. Management, to an ever-increasing extent, is making a cool analytical appraisal of communities before making a decision to either expand or install new facilities. Civic attitudes, good labor relationships, good work attitudes, competitive wage and salary rates and attractive social and cultural atmospheres are some of the factors that are being weighed when plant decision locations are being arrived at. For fu-

George Hawley
Southern California Edison

Paul Hallingby
Middle South Utilities

Brodie Leihy
Electrical West

ture growth, each community should understand that a good business climate is necessary to attract and keep employers and take steps to insure that the proper social, political and cultural influences are created within its area.

The benefits of intra-industry partnership were described by M. E. Skinner, vice-president of the Union Electric Co., and Howard R. Stevenson, manager of sales, The Detroit Edison Co. The former emphasized the impact that can result if all segments of the electrical industry not only promote and work with the "Live Better . . . Electrically" theme but also gear their promotions to the EEI coordinated promotional calendar. Teamwork by the 4,000,000 people (2½% of the country's population) who constitute the electrical industry could produce an almost irresistible promotional climate. He cited figures to show that the electrical industry consists of some 42,000 business establishments which produce 12½% of the total gross national product and account for nearly 20% of the nation's capital expenditures.

This group, working together through their various trade associations and coordinating activities through such programs as National Electrical Week, can be most effective in keeping the standard of living on its upward trend.

Stevenson described the operation and the results to date of the Housepower program. In 1956, he said, the electrical industry spent $8,000,000 to promote an understanding of the word Housepower and to convince the American public that their homes need more wiring. This stimulus on the general public is being augmented, in many localities, in a contractor training and development program which is producing very satisfactory results where it is being employed. In fact, the success of the whole Housepower approach already can be measured in the sales of certain types of wiring devices, it was brought out.

Nationally prominent speakers addressed the meeting at its two luncheon sessions. Gwilym A. Price, chairman and president of the Westinghouse Electric Corp., delighted and inspired his audience by giving them a peek at the future (see page 75). At the second luncheon Edwin A. Vennard, managing director of the Edison Electric Institute, described the challenges confronting the electrical industry and all free peoples. He stated that the greatest threat to freedom and free enterprise lies in ignorance of the true economic facts on the part of the general public and he challenged the industry individually and collectively to help eradicate the ignorance that could legislate us into a collectivist dictatorship.

Section Meetings

At parallel sessions, George T. Bogard, manager of utility relations of G-E's Appliance Park, told the group that figures show that the electrical industry is being outsold, and outpromoted. For example, he cited the fact that liquor sales equal the dollar volume of appliances and electricity sold to domestic customers. He, too, urged utility leadership, industry teamwork and partnership and coordinated sales efforts as a means of improving the electrical industry's competitive position and enhancing the profit position of each segment of the electrical industry organization.

Carl H. Williams, manager of engineering for The Hawaiian Electric Co. Ltd., presided over a parallel session of the Engineering and Operating Section. At this meeting H. T. Zamzow of Line Material Industries described tests to determine the burn-down characteristics of various types of conductors. These tests, made for the purpose of minimizing damage and possible future service outages on overhead circuits, indicate that fast clearing, such as is possible with a modern power recloser, represents the most economical approach to minimizing conductor burn-down troubles.

H. E. Jung of the Southern California Edison Co. described his company's experience in the use of aluminum conductor on the distribution system. He described the practices which have been developed over some 45 years of experience with the metal as an overhead conductor and concluded that satisfactory service is possible provided (1) electrical and mechanical joints are protected from corrosion by the use of proper inhibitors; (2) the conductor is protected from corrosion; (3) that massive electrical connectors are used; and (4) that linemen be educated to treat aluminum as a metal different from other metals.

Aluminum also received more attention in the report of Dr. E. W. Greenfield of Kaiser Aluminum & Chemical Corp. who gave results of aluminum conductor tests in the Hawaiian Islands. These tests are part of a continuing study under conditions of exceptionally rigorous salt air conditions.

After second year of parallel sessions like this one G. A. Wintz directed, unanimous vote declared that the . . .

SW Inspectors Like Their Workshops

Workshop sessions were not the only feature of the 34th annual meeting of the Southwestern Section, International Association of Electrical Inspectors, held for the first time in Phoenix, Nov. 4-6. A course for the better training of electrical inspectors was initiated—one to be developed by the inspectors themselves. It was an outgrowth of last year's workshop idea, used at the Berkeley annual meeting and is the idea of the newly elected president, Barney Alverson, San Bernardino County chief inspector.

The aluminum conductor and connector panel that had featured the other section meetings was brought to this one too, adding to it former inspector and outspoken critic Harold Gerber, consulting electrical engineer, who voiced some of the practical field difficulties not yet fully solved for the use of the lighter metal. These dealt chiefly with pulling-in difficulty and inadequate space in cabinets and pull-boxes for the stiffer bends of the larger wire.

Panel members were Cecil R. Pickens, Kaiser Aluminum & Chemical Sales Inc., Chicago; Martin D. Bergan, The Thomas & Betts Co., Elizabeth, N. J.; H. H. Watson, General Electric Co., Bridgeport; Kent P. Stiner, BullDog Electric Products, Detroit; and the late Charles L. Smith (Mr. Smith died a week following the Phoenix meeting), IAEI secretary-treasurer, as moderator. (See October 1957 issue, p 118)

IAEI President H. S. Morr, manager, Utah Fire Rating Bureau, Salt Lake City, repeated his analysis of the economic position of the IAEI and the need for a realistic reappraisal of the costs of furnishing members both the field and office services they have expected. Smith reported on the time table for the 1959 edition of the National Electrical Code, for which any changes to be incorporated must be in by December. He also told of the rewriting of the code by Frank Thornton Jr., to improve its format and clarity, which may result in acceptance of the revised script for the 1959 edition.

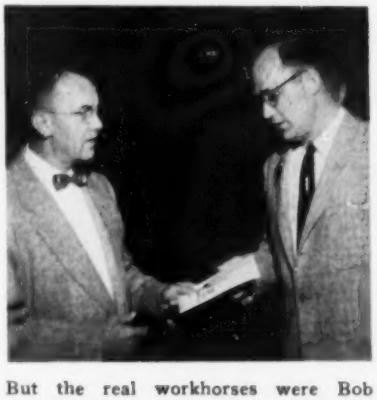
Everett Cogan, technical assistant secretary, IAEI, covered membership matters, the need for more complete fire reports, and National Electrical Week preparations.

Frank Jones, Southwestern Section president, chief engineer, Arizona Fire Rating Bureau, Phoenix, was brief in his presidential address, noting that it was the first annual meeting held in the state and announcing the launching of an educational program for inspectors at the executive committee meeting preceding the opening session. Jones presided over the general meetings. Incoming President Alverson was coordinator for the three parallel workship sessions conducted Monday afternoon and all day Tuesday.

It was out of these workshops that recommendations for code changes and clarifications came for final ratification by the whole group on Wednesday. There were three workshops: on residential installation, for which Joe Gross, Gross Electric Co., Phoenix contractor, presided; commercial installations, for which E. V. Muller, assistant electrical safety engineer, California Division of Electrical Safety presided; industrial installations, for which G. A. Wintz, chief electrical inspector, Los Angeles, presided. E. E. Carlton, chief engineer, California Division of Industrial Safety, conducted a separate workshop meeting on that state's safety orders and faults found in the field.

Code Revision Asked For

From the three workshops, briefly summarized, came the following re-



But the real workhorses were Bob Fassbender and Les Waggoner, APS

New officers for 1957-58: H. G. Ufer, F. C. Jones, A. C. Veit, E. E. Carlton, L. E. La Fehr, C. R. Pierce, Barney Alverson, president, E. L. Nelson, C. H. Clark, C. H. Hefner, H. K. Winterer. Six more were not present

quests for code revision, clarification or coverage, later ratified by the entire conference:

1. That something be done about interchangeable breakers to limit their interchangeability with those of higher rating. This was debated in all three workshops with somewhat different recommendations. Rather than wrangle endlessly over details of what final code changes to make it was finally agreed to ask that a special technical task committee be set up to go into the complete problem and come back with some acceptable solution.

2. That the code include provisions for use of high ampere capacity circuit interrupting devices. Such devices are being used successfully but no provision for them is made in the code and some inspectors do not want to assume the responsibility of approving their use. With increased loads and network systems the problem has become acute.

3. That the code contain provisions in respect to luminous ceiling installation to guide inspectors as to ventilation, dimensions and clearances from combustible materials and ballast type and location.

4. Along similar lines that much more clarification be given in rules respecting fluorescent fixture mounting, spacing from combustible materials, etc.

5. Larger size conduit for RHW wire was asked for and revision of space and splice limitations in conduit fittings, motor terminal housings and panel enclosures. Approval of larger sizes of liquid-type flexible conduit was also asked.

6. Demand factors for clothes dryers were requested. It was announced by Watson that studies by many utilities are being made to aid Panel 2 to revise demand factors for all appliances for the next code edition.

Put to a vote at the end of the report on the workshops it was voted overwhelmingly that this type of annual meeting procedure be continued. Only at the two luncheons were there any outside speakers.

Inspiring the inspector to regard his profession in a light of constructive good to his community, Jack L. McDonald, special services manager, Arizona Public Service Co., addressed the Monday luncheon. At the Tuesday luncheon a glimpse into the electronic future of the electrical industry and a prediction as to what inspectors must train themselves to be able to inspect with intelligence was given by two scientists, Dr. Friedriech Schwarz, president, and Robert Rutherford, chief engineer of U. S. Semi-Conductor Products Co., Phoenix. They described the principles and the potentialities of transisters and other similar new developments in applications for the automation of industry and control of machinery.

Officers were moved up in the annual election that closed the meeting. Barney Alverson, San Bernardino County, was moved from first

Transistor Experts Rutherford, Schwarz

International officers—Morr, president, speaking, late Charles Smith, E. Cogan

Guiding spirits—La Fehr, Morr, Alverson, new president

President Jones honored IAEI Past Presidents Trim, Ufer

vice-president to president to succeed Jones, who becomes a member of the executive committee. Chester H. Hefner, San Mateo County, is first vice-president. Prof. Irving Sandorf, University of Nevada, is second vice-president, Arthur Vesco, San Diego City inspector, is third vice-president. L. E. La Fehr, Alhambra city inspector, continues as secretary-treasurer.

On the executive committee besides the officers and past president are: Cecil H. Clark, Arizona Chapter; Charles R. Pierce, Central California Chapter; E. Warren Small, Hawaii Chapter; M. E. Lundberg, Nevada Chapter; Ernest E. Nelson, Northern California Chapter; Lester Woldit, Sacramento Valley Chapter; Ed Muller, Southern California Chapter; H. K. Winterer, William A. Cyr and H. G. Ufer, associate members. E. E. Carlton and A. C. Veit were elected to the executive council with Frank Jones as an alternate.

Hospitality and excellent management of all of the convention details and arrangements were deservedly commended by everyone. The hard-working and always cheerful and helpful committeemen were headed by a pair of Arizona Public Service topnotchers, Les Waggoner and Bob Fassbender. They were aided by Ralph Babel, Bill Strubee, Tom Regas, Sam Schurgin, Bill Cyr, Barney Alverson, Bill Parker, Bill Harm, Joe Gross, Lou La Fehr and Mr. and Mrs. Mel Long.

Next year's meeting will probably be held in San Diego or Long Beach and the dates are Sept. 22-24.

Education Starts With Organization

Inspired by Barney Alverson, assistant building official, San Bernardino County, and chief electrical inspector, and Jesse Ross, chief electrical inspector, San Bernardino city, the inspectors of 11 communities in San Bernardino County were called together with a view to obtaining more uniform interpretation of their ordinances and the National Electrical Code. Out of this grew an informal association which they call the Inland Empire Electrical Assn. and inspectors from Riverside County have also joined in some of the meetings.

The aim has been to study their individual ordinances and arrive at more uniformity in rules, regulations and interpretation. One of the results has been the formation of a recommended ordinance which six or seven of the cities in the county have already adopted.

Members from the allied electrical industry are invited to the meetings and their suggestions are also taken into consideration.

Similar groups have also been studying the local ordinances in the San Francisco-Santa Clara area and the East Bay of San Francisco Bay area with a view to unifying the codes and ordinances. This has come about from the realization that the bordering towns often have rules which are confusing to electrical contractors who work in all areas and when uniform rules are promulgated they can work with better conformity to the safety regulations.

Valley Classes Held

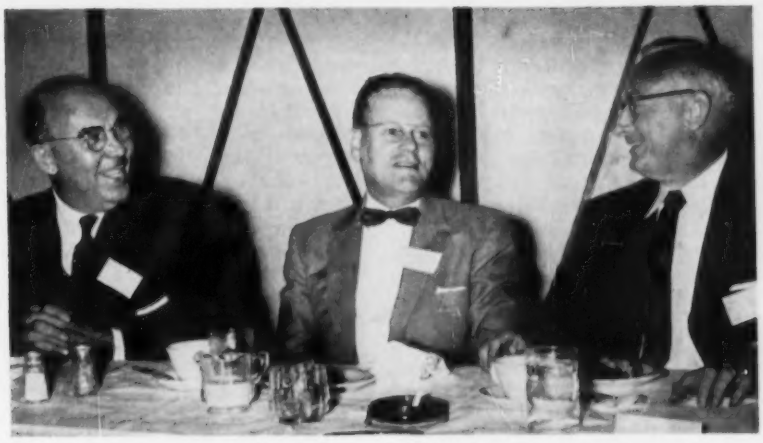
Resumption of the code classes so successfully conducted in the spring will soon be made in the San Joaquin Valley. They were discontinued during the summer months only.

Adoption of uniform electrical codes by an increasing number of San Joaquin Valley cities led to the formation of special classes to study the codes so as to insure better understanding and uniform enforcement.

Classes were sponsored by the Sanger Union High School department of adult education. They attracted building inspectors, electrical inspectors, electrical contractors and utility personnel. The classes, held twice a week for three hours each night session, not only covered the electrical code but wiring methods as well. The instructor was C. W. "Chuck" Pierce, chief electrical inspector for the city of Fresno. Class books used were: Course in Electrical Wiring, Part 2, printed by the State of California; National Electrical Code; California Electrical Safety Orders. During the course, safety engineers Ira Allen and Keith Karr, engineers from the State Department of Industrial Safety, showed slides of violations.

Part of the sessions are devoted to discussions, which develop considerable enthusiasm among those in attendance and add to the clarity of understanding and the cooperative attitudes necessary for successful enforcement.

Classes started in February this year and attendance included representatives of 10 contractors, 14 utility representatives and a large number of representatives of the various cities, as well as one industrialist.



From left: Arthur Swank, Frank Tracy, G. N. Hawley, Charles Davies and George Larsen. Davies sponsored Credit & Collection

PCEA-PCGA joint conference

Takes a New Look—Now

A practical attitude was prevalent at the joint fall conference of the Pacific Coast Electrical Assn. Administrative Services Section and the Pacific Gas Assn. Accounting Section.

Held at the Villa Hotel in San Mateo, the conference used "Let's take a new look at our problems now" as the meeting theme. George N. Hawley, president of PCEA, commended the group for this particular approach because people "looking *now* provide the basis for industry stability." Further evidence that the approach was timely is indicated by the record-breaking attendance of about 185 delegates.

Presiding over the meeting were W. N. Fairlee and H. C. Hammond, co-chairmen of the section, who represented PCEA and PCGA respectively.

Hawley, speaking at the first day luncheon, laid many of the cost problems faced by utilities in the lap of external forces, mostly emanating from government policies and practices. He said the full employment policy adopted by the federal government in 1946 has evolved to an inflationary policy, and the industrial world is attempting to live with the results of this today.

The U. S. economy today is affected by uncertainty, he said, because it is neither based on freedom of thought and action, businesswise, as it was originally, nor is it "collectivism" as is found in Russia. It is part of each and the uncertainty comes from wondering which way will eventually dominate. The growth of the "collectivism" philosophy through the years has had the effect of shrinking the controllable cost area in industry, which in turn is adding to the problems of operating a business.

Credit and Collection

Charles Davies, Sponsor

The credit and collection sessions provided what may be a concrete tie-in with the national economy and utility operations. Delegates discussed the suitability of their credit and collection methods in the face of ever-increasing delinquent accounts and loss write-offs of uncollected bills. An example: Paul Lancefield, manager of the customers office of Portland Gas & Coke Co., said a credit survey made for gas companies showed that their net charge-off rate increased 21.5% in a single year in 1955-56 and has been increasing steadily since.

Biggest source of uncollected accounts is customers moving off utility lines. Lancefield said the best corrective measures seem to be firm, prompt follow-up, deposits from uncertain credit risks and direct contact by telephone instead of total reliance on letters. He said the use of field men to make collections does not usually pay off unless the account is for $30 or more.

As delegates exchanged ideas on collection practices in discussion sessions, an intriguing operational problem was brought to light. When utilities go through the difficult changeover period from former billing methods to electronic data processing, delinquent accounts take an extremely sharp rise. As a rule, experience shows, this settles down to normal after a period ranging in length from three to six months, but not before the cost to the utility has risen to impressive figures, depending on the size of the company.

One delegate, whose company had experienced this phenomenon, said that analysis afterwards showed that the key to the solution might be found to be a lack of consideration of the human element before putting machine billing into operation.

His thought is that the technical side of a changeover to EDP is being done well, but the problems that will confront the people working with the machines are not studied closely enough.

An example is found in the collection problem. He said that in the planning stages for EDP, the EDP technicians should ask the credit personnel: "What can you give the machine in the way of source information?" then: "What finished product

Harry Clark, left, shows H. W. Swanson some items in free access bins of PGE

do you need to help with your collection?" Instead of this approach, what is usually found is extremely close attention to technical details, little communication with personnel that will be associated with the machines, and a subsequent lack of faith in the machines, mostly coming from a lack of understanding.

Timing of the breakdown is unfortunate—and this is the costly part—because it occurs after the machine system is in operation and has a failure of some kind, probably minor, that bolsters the feeling of a lack of faith in the equipment.

In keeping with the theme of the meeting, the credit and collection section discussed in detail 16 operational phases or problems, each led by a delegate given the assignment. This attention to detail stimulated a valuable idea exchange.

Discussion leaders were: George H. Larsen, Southern California Edison Co.; E. C. Paddock, Pacific Gas and Electric Co.; and Paul Lancefield, Portland Gas & Coke Co.

Purchasing & Stores

H. W. Swanson, Sponsor

"Free access materials" is one way to identify the hundreds of items in utility company stockrooms that do not cost enough, individually, to warrant a great deal of expensive paper work, but which are still an important part of costs when considered in the aggregate.

Utility companies are trying various ways of issuing these stock items to working crews without getting into too much costly handling expense. One system was described by Harry L. Clark of Portland General Electric Co.

PGE analyzed about 75,000 individual pole line hardware material issues from—and returns to—stock. They learned that most of these were for about 125 small-cost items used on every distribution job. From the analysis the company established a standard accounting distribution for each stock item to which it can charge bulk lots of pole line hardware. Distribution turned out to be 90% to respective plant accounts and 10% to the related maintenance account.

The company separates stock items into warehouse stock and bin stock, the latter being the "working" stock. Items transferred to the bin stock and properly charged off the stores account then become "free access material" in that it could be issued without a stores requisition.

On the subject of "Centralization vs Decentralization of Purchasing and Stores Operation," Ray P. Benton of PG and E presented the thought that it is the responsibility of purchasing and stores management to constantly review existing practices to be certain the most economical methods are being used.

Viewed with this in mind, the question then becomes a matter of wisely using both methods rather than a choice between the two. Benton was referring to performance rather than to two other components of management, namely authority and function. The authority of the stores department, and the over-all function of the department can be centralized while in performance the operation is taking best advantage of the economies available by both centralized and decentralized methods.

Art W. Holt of Arizona Public Service Co. emphasized the importance of close communication between the accounting, purchasing and stores departments as utilities investigate the possible economies of "prefabricating" various standard assemblies in both electric and gas operations.

As companies look for further refinements of the prefabricating and packaging that has become more or less standard through the years, the employment of sound accounting practices is a *must* because the success or failure of setting up a prefabricating or packaging program will depend most directly on the factual truth that is told in the accounting story.

At any rate, properly used, the prefabricating of certain assemblies by less skilled labor in supply depots can save many important dollars through more efficient use of highly skilled labor in the field.

A fourth discussion leader in the purchasing and stores sessions was J. M. Baron of PG and E, who presented a paper on free access materials, gas utility application.

Accounting

R. E. Dake, Sponsor

Employee and supervisory relationships in the accounting department received the close attention of this section of the conference. The second day luncheon speaker, Dr. Thomas W. Harrell, professor of applied psychology of Stanford University's graduate school of business, contributed some thoughts that tied in directly with the section's theme.

R. E. Dake, light suit on right, mediates discussion in Accounting Section session

He pointed out that individual attitudes cannot be "trained" into a person with any assurance of permanency, because the person's attitude or outlook, regardless of training, will reflect that of the management or supervisor in the long run.

Four practices cited by Dr. Harrell that tend to improve both morale and productivity are: (1) differentiating duties between the supervisor and his workers, (2) giving responsibility and job freedom to workers, (3) taking a real interest in employees with discipline based more on understanding and less on punitive measures, and (4) good group relations with employees.

In the section meetings, the delegates heard papers on orientation of employees, training; hiring, appraisal and progress interviews; corrective interviews; communications; job rotation and motivation.

"Every employee, be he old-timer or newcomer, usually has some uncertainties when undertaking a new assignment. I contend that the right start toward dispelling his qualms, and to rout out the secrets and mysteries of the new assignment, must rank as being of major importance in the area of human relations." These are the words of S. E. Johnson, Southern California Gas Co., who led off discussions in the accounting section.

Owen Marsh, Southern Nevada Power Co., on the subject of training, said:

"Training can be defined as enabling people to acquire the knowledge and skill necessary to do their work well. To this definition I would add what is perhaps the most important aim of training, and that is to cause people to become interested in their work."

The human side of the accounting department, "Let's Talk it Over," was discussed in a session led by Claude V. Hatfield, California Electric Power Co. Primarily this was a discussion of accepted standards for selection of employees for specific jobs, and some of the methods of testing, etc., that help with selection. Three check points given by Hatfield that will indicate employee progress are: the hiring or approval interview, the appraisal interview and the progress interview.

The subject of corrective interviews was presented by Kenneth E. Battin of San Diego Gas & Electric Co., who said the objective of the interview is the saving of employees for the company and welfare of individuals — both supervisor and supervised. Ten steps in the corrective interview are: get the facts, choose a private place for interviewing, begin with a question, give employee opportunity to talk, carefully consider all evidence, fit correction to the error and not the individual, maintain calmness, close pleasantly and restore self-confidence, follow up with a second interview and do not use correction too often.

Communications, job rotation and motivation were covered in papers by R. L. Weil, Pacific Lighting Gas Supply Co., C. D. Swanson, Southern California Edison Co. and Lyle E. Beard, British Columbia Electric Co.

Right-of-Way & Land

A. W. Althouse, Sponsor

"In legal draftsmanship, as in all writing as well as in speech, simplicity is the mark of excellence." This was a conclusion offered by Clinton Tinker, assistant counsel of Edison Co., as he pointed out language pitfalls in legal documents to delegates. At the same time he emphasized that there is no short cut in drafting a satisfactory legal document.

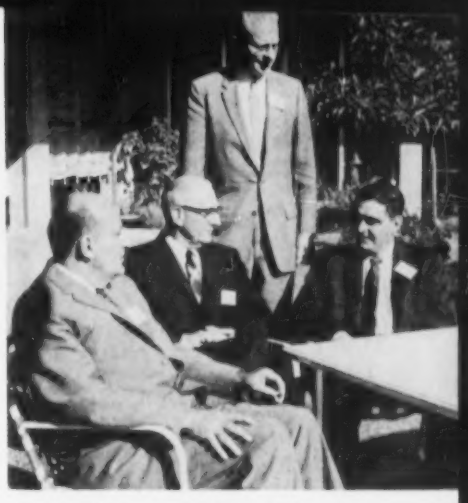
"The opportune time to avoid future difficulty is at the time of the creation of the instrument. Industry and ingenuity are necessary in draftsmanship to take full advantage of this opportunity," Tinker said.

J. Mortimer Clark, prominent California real estate appraiser and counselor, and president of the California Real Estate Assn., gave the group valuable pointers on real estate appraisal techniques and approaches to appraising.

A three-step appraisal procedure is (1) gather data, (2) analyze data, and (3) arrive at an opinion of value using one of three approaches. Cost of the property, historically and at present, is one basis for establishing value. A second is income analysis —how much will be property earn as compared with cost. The third is a comparative method which involves studying sale prices of similar properties or neighboring properties.

An innovation for land and right-of-way delegates was found in the presence of Laverne Herbruck, Title Insurance & Trust Co., Los Angeles, who talked on the place of title insurance companies in utility land negotiations.

Using several case histories as examples, Herbruck explained to the group that it is not the routine cases that hamper the functions of title companies during negotiations, but the special problems that arise can and do cause annoying delays and special handling. Utility land and right-of-way acquisitions are loaded with exceptional circumstances as a matter of course.



A. W. Althouse, standing, looks on as Laverne Herbruck, O. N. Kulberg and B. Z. Kastler talk over Right-of-Way and Land problems

Prognosticating for a bit, Herbruck said:

"Absent war, in which case all bets are off, the next three or four years will probably be the lull before the storm as far as (California) land developments are concerned."

A test experience of Southern California Edison in the use of helicopters for transmission line construction indicates that the air age will soon invade the utility industry.

O. N. Kulberg, reporting on the experiment, told the group that use of a helicopter in constructing a 25-mile section of 230-kv transmission line in a mountainous section cost $6.80 a ton-mile as compared with $7.46 a ton-mile cost of building roads and truck hauling.

In the test situation, the company built the roads and used conventional methods to establish the $7.46 figure. Then, in cooperation with the Sikorsky Division of United Aircraft Corp., the bundled materials were handled and hauled by air to determine first whether it could be done and, secondly, to determine what the cost would be. The helicopter delivered 593 tons of steel in 65 hours and 13 minutes flight time.

Kulberg said the significant savings in this type of operation will come from cheaper land cost in heretofore inaccessible terrain, less land, crop and property damage claims caused by roads, road hauling, men and equipment. Also, rugged terrain should permit greater spacing of towers with an accompanying saving.

Other discussion leaders in the land and right-of-way sessions were: Richard O'Neill, PG and E; and B. Z. Kastler Jr., Mountain Fuel Supply Co.

Power Use Workshop brings companies and co-ops together to

Pull In Harness for Farm Power

A more significant meeting than generally realized was the fourth annual National Power Use Workshop Conference of the Inter-Industry Farm Electric Utilization Council held in Denver two months ago. It constituted a facing up to a realization by both cooperatives and investor-owned power suppliers that, like it or not, both exist and the public's needs for power demand that they work together to supply it rather than fighting. If any fighting is to be done it is for more balanced electrical load by selling more power usage.

Several of the impressive list of speakers from both kinds of power suppliers expressed such thoughts. Walter T. Lucking, president and general manager, Arizona Public Service Co., in a keynoting address to the state council dinner, told of cooperation between his and other utilities—districts and companies—serving Arizona and neighboring California. REA Administrator David A. Hamil and Harry L. Oswald, manager, Arkansas State Electric Cooperative, vigorously championed the same theme.

Other speakers spoke for and against direct merchandising by the power supplier in order to get the job done, on LP gas competition, water heater standardization, the industry campaigns such as "Farm Better Electrically," Housepower and National Electrical Week.

All power suppliers must "work together in a spirit of cooperation" to meet the farmer's needs," Hamil declared. "The task is so great that no one portion is capable of doing it alone. This requires that all power suppliers work together in a spirit of cooperation.

"Nor should power suppliers ignore the opportunity to combine their efforts with those of their trade allies, such as the manufacturers and distributors of electrical appliances and equipment."

Hamil said of the nation's four million farms "nearly all have electricity. Some have been slow to harness new power. For example, better than 50% of them still do not have running water—a convenience that an electric motor can provide. I do not believe that this is necessarily the fault of the farmer."

J. F. Maddox, president of the New Mexico Electric Service Co., told the conference that, although rural America offers a potentially greater market for electrical sales than urban areas, rural electric cooperatives are spending less on sales campaigns than electric companies.

Maddox said rural electric cooperatives spent an average of 1.2% of their operating revenues in 1955 on sales promotion, class A and B electric companies spent 1.6%.

He asserted that "the record shows that electric co-ops that conduct planned, coordinated sales campaigns outstrip other co-ops by substantial margins in revenue building."

Harry L. Oswald, general manager of the Arkansas State Electric Cooperative Inc., pleaded for all parts of the electric industry to put aside animosities generated from competition and conflicting philosophies and join in promotion of power use.

"Whether it appeals to us or not," Oswald said, "we are undeniably associated together in the field of power use and must accept that ungarnished fact if we are to grow and prosper at a rate which is expected of us."

Oswald said because of a "unified coordinated approach" home economics and home demonstration teachers in Arkansas have for the first time been given short courses in ranges, refrigerators and freezers to better enable them to teach and demonstrate the use of those appliances.

"At this time," he said, "county agents and the vocational agricultural teachers of our state are carrying out a unified program of adequate wiring, reaching every home and every farm in our state, because manufacturers, distributors, commercial power companies and electric cooperatives are working together with them."

The lack of standardization is a major reason for the decline in the sale of electric water heaters in recent years, Paul D. Brooks, vice-president of the American Gas & Electric Service Corp., said.

Electric companies and cooperatives in rural areas were urged to give aid in creative selling to dealers by H. L. Travis, vice-president, sales, Kelvinator Division.

The dealer, Travis said, "is hard pressed, but he will live through it—and you'll be mighty glad in the future that you worked with him. . ."

The dealer today, Travis said, is "making a pittance, in gross or in actual dollars, on every major appliance he puts on your lines. But when that appliance goes on your lines it becomes a year-after-year source of real gross income to you—gross income that amounts to many hundreds of dollars during that appliance's lifetime.

"I ask you in all fairness—compare what you get from that appliance with what the dealer gets today, and I think you'll see why mutual effort is not too much to ask."

The three-day conference drew 766 registered delegates and most sessions were attended by more than 1,000 persons.

J. F. Maddox of Hobbs was elected to a three-year term as a member of the Inter-Industry Farm Electric Utilization Council. He succeeds C. V. Sorenson, vice-president and general manager of Indiana & Michigan Electric Co., Fort Wayne, Ind.

Calendar

February, 1958

3- 7—**Western Market,** Western Merchandise Mart, San Francisco

9-15—**National Electrical Week**

14-15—**Seattle Electrical Show,** Civic Auditorium

15—**Snake River Valley Electrical Assn.,** Owyhee Hotel, Boise

March

6- 7—**Pacific Coast Electrical Assn.,** Business Development Section, Statler Hotel, Los Angeles

26-27—**Northwest Public Power Assn.,** Engineering and Operations Section, Clark County PUD Electric Center, Vancouver, Wash.

27-28—**PCEA,** Engineering & Operating Section, Sheraton-Palace Hotel, San Francisco

27-29—**Electrical Maintenance Engineers Assn.** of So. Calif., Industrial Electric Show and Conference, Shrine Convention Hall, Los Angeles

Interest rate weighed

By delegates at

REA's Portland Meeting

Preparation for a Congressional fight next year over REA's 2% interest rate took center stage at the annual meeting of the National Rural Electric Cooperative Assn.'s Region 9 in Portland.

Injected into the discussion was an admonition from REA Administrator David A. Hamil to the rural co-ops to beware a "Phyrric victory."

Declaring the day not far distant when capital needs of REA borrowers will touch $1 billion annually, Hamil said it was more important to maintain a stable source of credit for rural electrification than the low interest rate.

"Interest rates kind of follow a trend like the price of cattle" said the Colorado cattleman who became REA chief in June 1956. He indicated a "reasonable interest rate increase" would not hurt many of the co-ops.

Hamil said REA has the best record of any government lending agency and commended the co-op managers and directors on the success of their "bootstrap" operation.

"You are paying back on time the money you borrowed, and have paid back $113,000,000 ahead of schedule. Your payments in arrears are only $105,500—lowest delinquency rate in REA's history."

The REA administrator urged the co-ops to consolidate their gains and develop new business in the areas they cover.

"Now that you've got the lines out there, it's time for consolidation," he said. "On how well you develop your area may depend the security of your loans. This bootstrap operation that has done such a fine job in the last 22 years could fall on its face if you sit back and fail to develop your areas."

The delegates took the lead of Clay Cochran, Washington, D.C., legislation and research director for NRECA, who foresaw, "the fight of our lives next year on our interest rate." They adopted a resolution opposing "any increase whatsoever" in REA interest rates and particularly opposing the Capehart-Hiestand bills.

Clyde Ellis, NRECA general manager, saw the REA co-ops gaining economically but suffering politically from an "agri-rural revolution." Fewer and fewer of the customers of the rural electrification program are farmers. This year for the first time REA systems will receive more income from nonfarm users than from farm users.

"We must keep in mind that the rural electrification program is the child of politics. If it dies it will probably die by politics. . . Farmers are losing out rapidly in terms of influence. . . Is there a way to get these millions of nonfarm people we serve into the act?"

Ellis hinted possibility of an anti-trust suit against private power companies and their public relations agencies as result of federal court decision in the case of the trucking industry versus the eastern railroads.

Ellis said he wasn't advocating such a suit but wanted to know if there were enough co-ops with "money to kick in" for such a purpose. The Region 9 delegates subsequently adopted a resolution asking the NRECA to "explore immediately the possibility and advisability of prosecuting a similar case."

Congressional criticism of apparent excess cash reserves of some co-ops spurred a workshop session on that subject. Panelists explored purposes for maintaining cash reserves and factors determining their amounts and what to do with excess reserves.

Summarizing the discussion, Clarence J. Hunter, manager of Surprise Valley Electrification Corporation, Alturas, Calif., said reserves should be determined through long-range planning with full consideration for hazards of weather and disaster and should include a year's advance loan repayment. Once soundly justified, he said, the reserves and their justification should be no secret and should be laid before congressman and legislators as proof of sound business management.

Other panelists were Leo J. Carmody, president, Vigilante Electric Cooperative, Dillon, Mont.; Edward F. Wilson, assistant chief, Electric Operations and Loans Division, REA; Gilbert Gibson, president, Park Electric Cooperative, Livingston, Mont.; Glen Sawyer, manager, Lane County Electric Co-op, Eugene, Ore.; Ora Beasley, manager, Northern Lights, Sandpoint, Idaho, and Cochran.

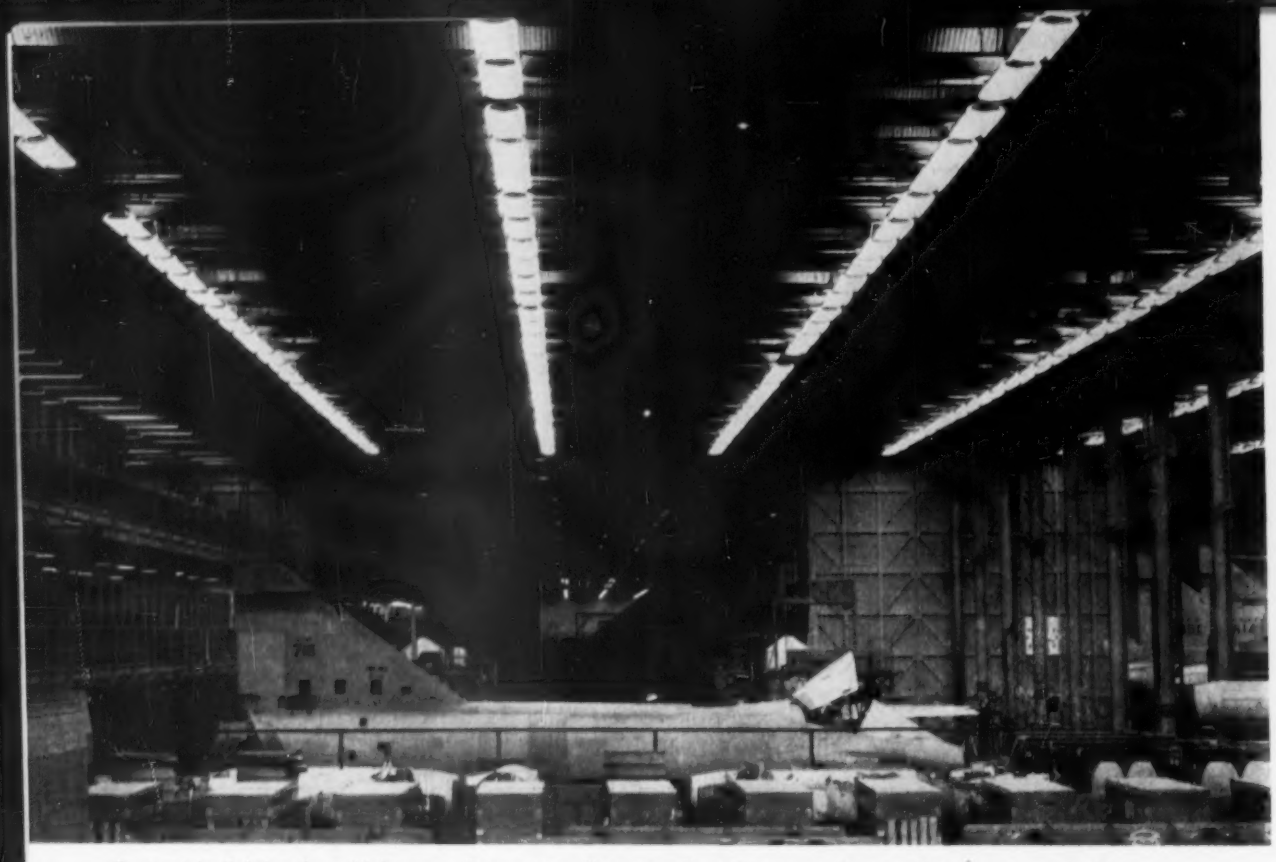
David A. Hamil, REA administrator, left, and John George, Lewiston, Idaho, president of the National Rural Electric Cooperative Assn.

Representative Al Ullman, Oregon congressman and one of the founders of the Hells Canyon Assn., said he has asked Secretary of Interior Fred Seaton to require that Idaho Power Co. agree to wheeling arrangements between the Bonneville Power Administration system and the Bureau of Reclamation system serving southern Idaho REA co-ops.

Both Ullman and Oregon's Governor Robert D. Holmes, who spoke at a banquet session, urged full development of upstream storage.

Branches North

Cascade Division of Puget Sound Chapter, National Electrical Contractors Assn., has been formed with 13 members in Snohomish, Skagit and Island Counties, Washington. H. L. Patchett, Industrial Electric, is chairman; Sam Ewing is vice-chairman. Charter members are Belden, Industrial, Intercity, Judd & Black, Maier and Everett Sound Electric, all of Everett; Ewing of Edmonds; John Haynes of Mountlake Terrace; Marysville Electric and McInnis of Marysville; Mercer Electric of Oak Harbor; Northwest Electric Service and Skagit Electric of Mount Vernon. Monthly dinner meetings will be held in Everett, according to Maynard Sundt, NECA chapter manager.



Contrast in lighting from high-power fluorescents (foreground) and mercury improved seeing so much that vast . . .

San Diego Convair Plant Converted

—without increase of existing wiring systems

W. E. Brautigam and L. G. Lamp, Electrical Design Section, Convair, San Diego

A new concept in factory lighting has been pioneered in the vast Convair plant in San Diego. It has been given reality by the engineered design of facilities to use the new fluorescent Power Groove lamps to replace older systems with only minor changes to the wiring and no interruption of production of aircraft. The result is perhaps the largest fluorescent lighting installation in the country in such a factory, with more than 3,000 fixtures in the initial phase and more to come.

USAF Plant No. 19 was constructed in 1940-41 under the dark clouds of an impending world conflict. Design and construction of the structures and facilities therein were influenced by the lack of two extremely critical elements, time and strategic materials. The results were factory structures adequate for accomplishing the immediate task at hand, yet reflecting the influence of the critical conditions. Lighting facilities, for instance, fulfilled minimum requirements, providing only sufficient intensity to accomplish the prime purpose of the plant, primary assembly of the B-24 Liberator bomber.

At the conclusion of World War II, the plant passed into the hands of private ownership. During this period maintenance of the structures and facilities were given minor consideration only. At the start of the Korean conflict, requirements for additional aircraft manufacturing space became imperative and critical. Faced again with the inevitable lack of time and strategic materials, the plant was repossessed by the federal government with technical ownership vested in the hands of the USAF. Activation of the production potential of the plant was the prime objective. Production lines were established, with rehabilitation of the structures and facilities held to bare essentials.

The most modern efficient machine tools yet devised were installed and manned by highly skilled technicians. The capital investment in machine tools per employee as compared to that of World War II was inconceivable. Yet as late as 1957, these highly efficient, costly machines were being manned by skilled operators in the depressing atmosphere of an antiquated, 16-year-old lighting system. It was a condition similar to that of a watchmaker repairing a chronometer in a blacksmith shop.

Air Force representatives, cognizant of the necessity for upgrading factory facilities to a point commensurate with the production potential of these machine tools, inaugurated a rehabilitation program. Funds were subsequently allocated for the purpose. On the shoulders of Convair's chief plant engineer, H. A. Smith, fell the task of determining the scope of the

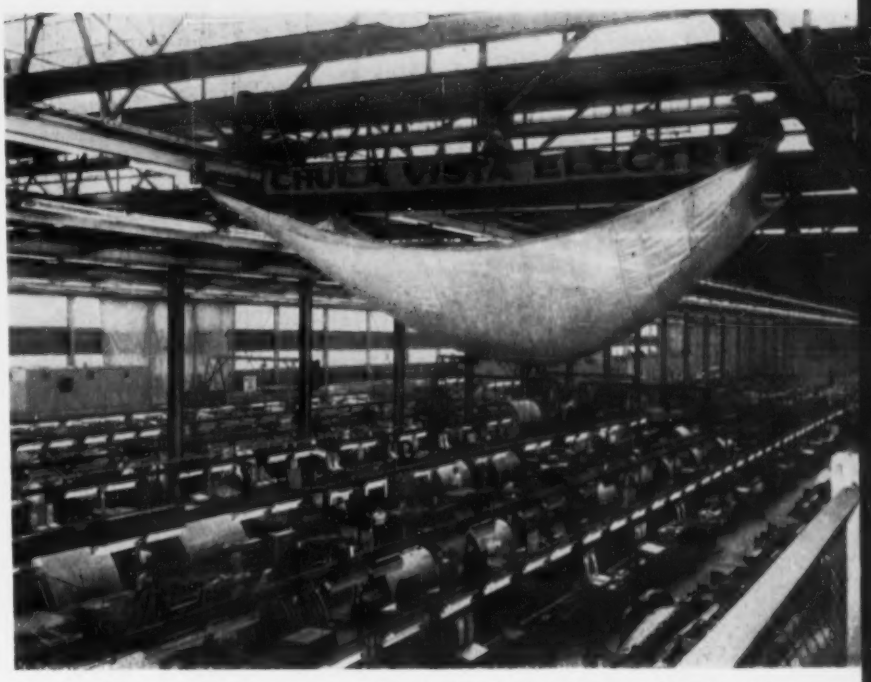
work involved. Smith was well aware that, all other things being equal, the full production potential of machine tools is governed primarily by the operator's ability to see. The ability to see is commensurate with intensity of available light at the right place. He therefore contended that proper lighting must be given prime consideration in executing the rehabilitation work.

W. E. Brautigam, heading the electrical design section, was assigned the engineering work necessary to accomplish the lighting rehabilitation. The task required the initiation of a research program, involving analysis of the latest developments in the field of commercial and factory lighting. The goal was to provide the ultimate in lighting, while utilizing existing circuiting to the greatest possible extent.

The existing facilities, designed and installed in 1940-41, consisted of 1,500-w fixtures equipped with 750-w incandescent lamps spaced on 20-ft centers. The fixtures were mounted in the high bays, 37 ft above floor level, approximately 120 v being delivered to the lamps from 120/208-v circuiting.

It was apparent at the beginning of the program that due consideration should be given the existing transformers, circuiting and power capacities. If the problem could be solved with only minor alterations to these existing facilities, a tremendous saving in cost would be realized.

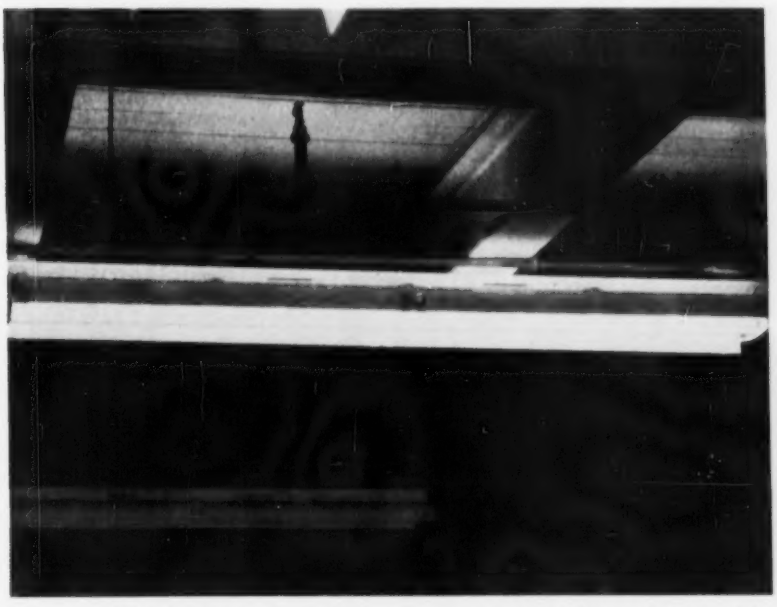
Early in 1955, considerable research indicated that color corrected mercury vapor lamps were apparently one solution to the problem. Subsequently, a specific test area was established and lighted with tandem-mounted, 400-w, mercury vapor lighting units. The lights were installed in a manner representative of a complete over-all installation. The results indicated that it would the verge of an entirely new concept be feasible to make such an installation with very minor additions to the existing circuiting. Therefore, serious consideration was given to acceptance of mercury vapor lighting as the ultimate and desirable method of solving the problem.



Aluminum movable rig contractor made to ride crane rails for refixturing job

However, in 1956, prior to completion of the tests, continued research indicated that at least two prominent manufacturers were on in fluorescent lighting (Power Groove and High Output lamps).

An actual working demonstration of the new-type fluorescent lamps was observed by a plant engineering representative attending the 1957 National Lighting Conference at Cleveland, Ohio. Subsequently the manufacturer's representatives were consulted and briefed on the progress of the Convair mercuary vapor lighting tests. As a result, they cooperated fully in furnishing all



How new All-Brite Power Groove Fixtures were suspended from exiting conduits

. . . replacing lamp at conduit fitting

available engineering test data on the new fluorescent lamps. Preliminary analysis of these data indicated the new lamps, in many respects, to be far superior to the mercury vapor lamp. In order to arrive at a definite conclusion it was decided to conduct an actual test, equivalent to that being conducted with mercury vapor lamps.

Consequently, arrangements were made through cooperation with the manufacturers of the new-type lamp and fixture manufacturers to establish a second test area within the plant. It was immediately apparent that, because of the inherent characteristics of the new lamp and Convair's specific requirements as to safety and maintenance, conventional commercial fixtures would not fulfill requirements.

Design of the new fluorescent tube was based on the proved principle of the latest 8-ft, 90-w conventional tube, redesigned to accept a loading of 200 w.

The new design resulted in a corresponding increase in lumen output and temperature rise. The temperature rise was incompatible with conventional fixture design.

Fixture manufacturers, cognizant of the problem, cooperated fully and submitted samples of specially designed fixtures for approval. Final fixture selection was based on a unit incorporating such desirable and specified features as adequate ventilation for both ballast and lamp, spring-loaded sockets for efficient contact and safety, and lamp center-to-center spacing compatible with design of fixture shielding. Twelve two-lamp fixtures of the approved type were subsequently installed in the designated test area and submitted to an eight-month operational test. Comparative results of both lighting tests including evaluation of the original incandescent lighting are shown in the accompanying table.

During the eight-month test (5,760 hours), the fluorescent lamps were operated continuously without a single failure of ballast or lamps. The lamps were removed and examined at the conclusion of the test period. Noticeable deterioration was not apparent and from all indications the lamps could have remained in service for an additional 5,000 hours or longer. A considerable reduction in relamping maintenance was indicated by scheduling a relamping program based on the indicated life expectancy.

As a result of the research program and subsequent tests, all high-bay areas of USAF plant No. 19 are, or soon will be, equipped with the new fluorescent tubes and fixtures. This totals approximately 3,000 All-Brite fixtures equipped with 6,000 8-ft fluorescent Power Groove lamps lighting an area of approximately 600,000 sq ft. The resulting average lighting intensity of 74 f-c at 48 in. above floor level marks the installation as one of the most modern factory lighting systems to date. The plant engineering department feels that the goal, established at the beginning of the program, has been achieved.

Analysis of the final results proves without a doubt that the new fluorescent lighting installation delivers usable light at a substantial reduction in operating cost per foot-candle per hour. A further reduction can be realized through proper treatment of surrounding reflective surfaces. A specific processing area within the plant with newly painted walls and ceiling is an outstanding example. The surfaces were painted "High-Bay Green." This particular color is mixed for Convair by the paint manufacturer in accordance with Convair Spec. PA 1-18-24. The basic color is white, with sufficient green added to eliminate glare. Average foot-candle reading in this area, all other factors equal, is 80 f-c, an increase of 12% over similar untreated areas.

A new installation in which the problem of utilizing existing circuiting would not be involved should, for efficiency, be designed around 277/480-v circuiting rather than 120/208 v. Several manufacturers of lighting equipment can furnish test data verifying the advantages, economical and otherwise, of using higher voltages for this type of lighting.

Mention should be made, at this point, of the considerable apprehension felt in regard to actual execution of the work. A major portion of the area affected would require activity in the high-bay areas directly over, and 35 ft above, production personnel. Production extended through three shifts, which precluded the possibility of limiting installation work to off-shift periods.

The ingenuity, however, of Joe Burkhart, owner, and Tom Clark, general superintendent of Chula Vista Electric Co., installation contractor, was equal to the problem. Two lightweight aluminum, bridge-type, rolling work platforms were constructed. These platforms were manually operated and capable of traveling throughout the high-bay areas utilizing the existing overhead crane rails.

Because of the light weight and portability of the platforms, interference with the normal operation of the factory bridges was easily avoided. Practically all the work was accomplished using these platforms. Not one case of injury or damage to production personnel or material occurred even though approximately 20,000 man-hours were expended directly over hundreds of factory workers by mechanics constantly handling small tools.

Due credit must be extended plant engineering supervision, USAF representatives and the various manufacturers for the part they played in bringing the program to a successful conclusion; plant engineering supervision and the USAF representatives for their decision to follow modern trends in lighting; and the various manufacturers for their cooperation and assistance.

Test Comparison of Lighting Sources

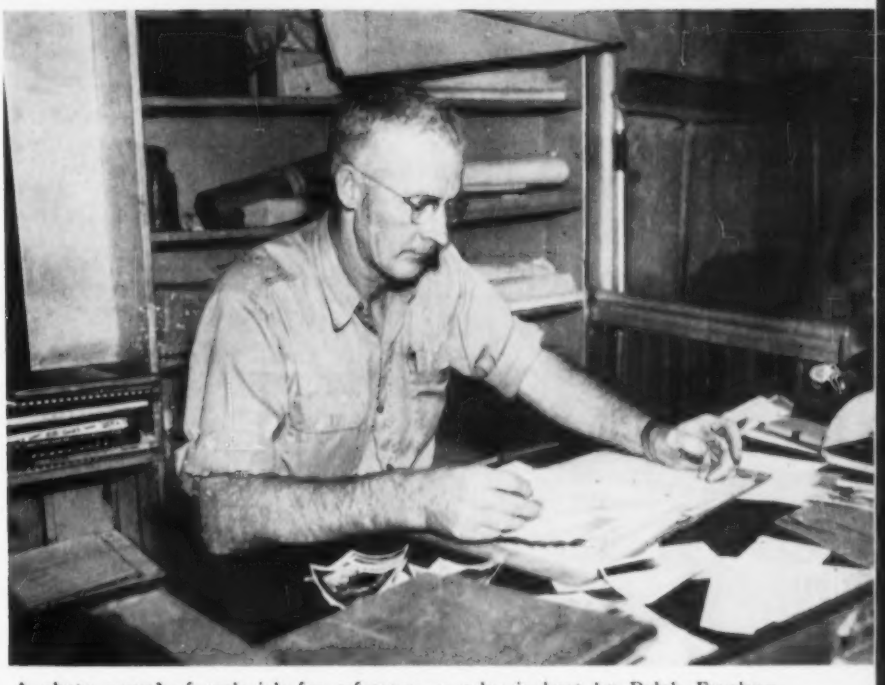
	Incandescent	Mercury Vapor	Flourescent Power Tube
Starting time	Instantaneous	4 to 8 minutes	Instantaneous
Estimated life	2,000 hours	7,000 hours	10,000 hours
Color	Yellow-white	Cool white-green	Cool white-clear
Contrast	Good	Fair	Good
Shadows	Very noticeable	Very noticeable	Slightly noticeable
Glare effect	Favorable	Bad	Favorable
Light distribution	Poor	Fair	Good
Eye comfort	Fair	Poor	Very good
Input watts (per outlet)	750	875	960
Lumens (per outlet)	15,600	41,000	52,000
F-c 48 in. above floor	7 to 12	41 to 45	68 to 80
Cost of lamps (per outlet)	1.50	25.00	13.68
Installation cost (per outlet)	34.32	218.00	196.00
Operating cost f-c/hr	.062c	.019c	.012c

Note: Each outlet consisted of the following:

Incandescent	One 750-w lamp
Mercury vapor	Two 400-w lamps
Fluorescent	Four 200-w lamps (two fixtures)

McMinnville contractor finds it pays to

Use Camera As a Tool



A photo record of each job for reference or sales is kept by Ralph Farnham

A camera may not be thought of as a good tool to have in an electrical contracting business. But Ralph Farnham of McMinnville, Ore., uses his one-minute (Polaroid) camera in his business in several ways that save time, confusion, and, in the long run, money. He has found that in business too a picture saves ten thousand words.

Farnham, owner of Farnham Electric Co., has been using the 60-second camera in his work for the past two years and has realized savings of both time and effort.

Application of the camera in Farnham's electrical contracting and service work is ever increasing but perhaps the most common use is for job layout, job progress and for ordering parts — a procedure that seems simple enough but can cause serious problems at times.

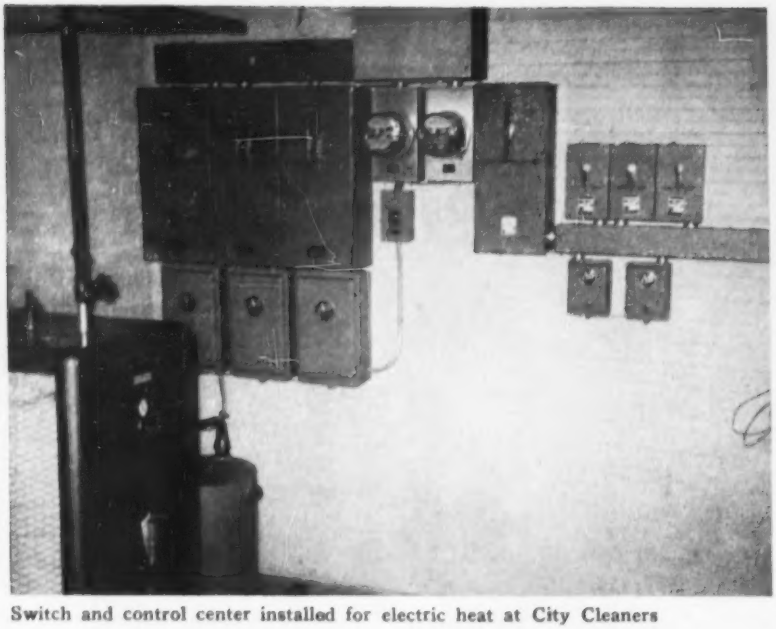
It was a situation involving a parts order that first brought the direct-print camera into Farnham's hands some two years ago, he recalls. "I had toyed with the idea of using pictures for clarification of jobs and for progress reports for some time, but it took a bolt of lightning to get me started," he said.

It was an actual lightning bolt, and it knocked out lights in the high school's athletic field. The lights were repaired but it was not until the day before the big football game during a practice session that it was discovered the electric scoreboard also had been put out of commission. Parts were ordered from the factory, but the company wired back that some of the parts could not be identified from their description. The next day, Farnham borrowed a friend's 60-second camera, photographed damaged parts of the scoreboard, and received the necessary items by return mail.

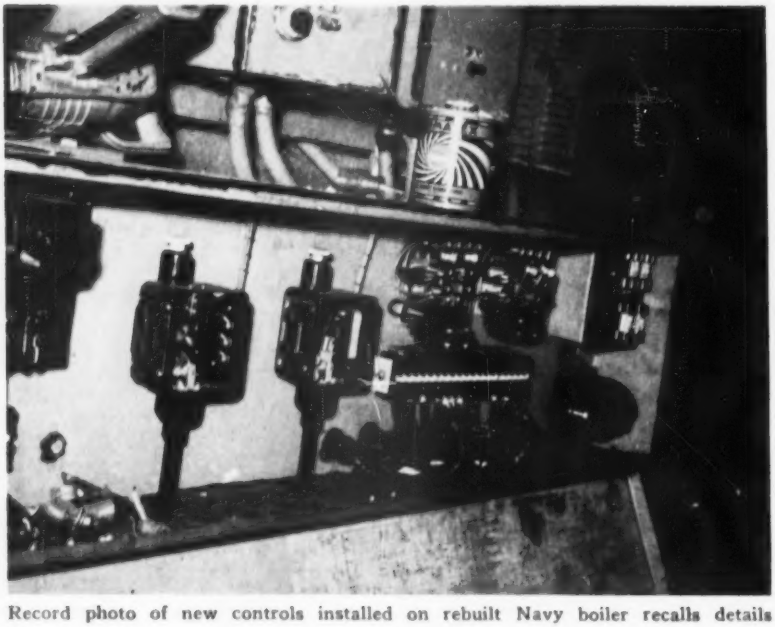
"We continually were sent the wrong brushes for a motor until we began sending photographs along, pointing out placement of the brushes we needed," Farnham explained. "Since that time we haven't had any trouble.

"We also found it useful in ser-

Snapshot of Farnham Electric linemen aiding with school field floodlights. Such pictures are used by local paper and make good publicity for contractor



Switch and control center installed for electric heat at City Cleaners

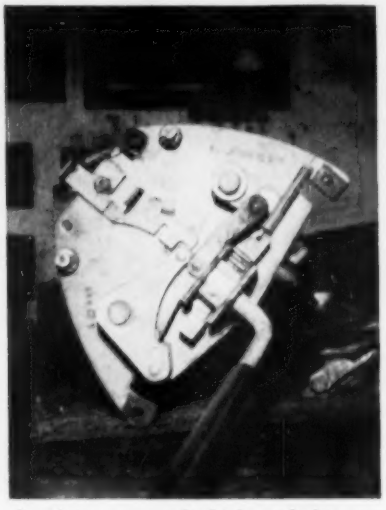


Record photo of new controls installed on rebuilt Navy boiler recalls details

vicing older appliances when parts were no longer in widespread use. Sometimes it was only the name that was confusing. If we asked for a shaft, we found we should have asked for a spindle and vice versa. Pictures tell the story and eliminate that problem."

Farnham first began using photography to depict progress of work by his firm more than 10 years ago. A movie camera, which he still carries with him in addition to the picture-in-a-minute camera, was used to record installation of mercury-vapor lights along a highway through the city and later was used on other large projects. But the expense of many feet of movie film, as well as delay in receiving the finished project and difficulty in viewing, made extensive use impractical.

When called to estimate a proposed change in wiring or request for additional service, Farnham now includes the quick and simple photograph in his routine survey of the project. The photo becomes part of permanent records in his office for use as reference at a later date or for working instructions for his crew. "Directions inked directly on the photo are a graphic illustration of what I want done," he explains.



A print removes doubt in ordering appliance parts from the manufacturer

On larger jobs, pictures taken during regular intervals serve as a record of progress and also can be used to demonstrate new methods and unusual application of equipment. Photos of faulty installations which Farnham has been called upon to repair not only show errors but the corrective measures that are necessary. Pictures also have been used by Farnham to settle disputes on building codes. In a specific instance, a photo depicted a situation that was governed by two conflicting codes. When presented to an inspector, the trouble was ironed out.

Fire hazards, fire and storm damage for insurance reports and pocket-sized copies of floor plans for ready reference — all have been recorded through the lens.

Experience in all types of conditions and varied subjects have made Farnham a proficient photographer. He is looking forward to the time when direct-color prints can be made by the 60-second process, which will more readily show colored cables and will greatly add to the value of his photos.

"It will also eliminate some problems," he said with a smile. "Once I studied a picture to figure a way of by-passing a conduit, only to discover it was the handle of a broom I had neglected to move before I snapped the shutter."

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Crystal ball stuff

Who are we not to do a little scanning of the Western horizon for 1958? Everybody's doing it. For contractors and wholesalers not addicted to ponderous opinions, here are a few pot shots from the hip on a quick draw. 1958 is going to be tough but it can be good. It will be rough because it means some big changes in national affairs. We could almost go on a war basis to throw everything into a Sputnik race. Could mean rationed materials of some kinds, controls on business, wages, money. Maybe it won't go that far. However, the type of construction could shift and there could be a lot of it for somebody in some strategic places. It might be pretty slim in others.

Want space to rent

Shift from residential single family to apartments and multifamily units has been the most notable change during the last six months. Building permits are reported down from almost all parts of the West. But population keeps coming Westward. Once here it seems to be spreading back into the desert areas where there is land, if not much water. Industries continue to come and likewise set up shop in the open spaces.

Fateful words

"As long as Charlie Smith is able to travel you'll find him coming out to the grass roots." By the irony of fate these words proved rather prophetic, for when Charles L. Smith, secretary-treasurer of the IAEI, returned to Chicago from the Phoenix SW Section meeting, he died Nov. 12 and will travel no more. The question of his attending chapter meetings had been spoken of in trying to adjust the IAEI's affairs to new conditions and old income. Mr. Smith faced such a crisis when his predecessor, Victor Tousley, died, leaving the problem to be solved. He did a remarkable job of reorganization. Charlie Smith's passing will bring IAEI to face a new crisis—finding a successor who can take the man-killing work and travel load. (See October issue, p 116, also p 94, this issue.)

Still rising

Material prices continue reaching upward. These changes are not drastic but each week sees a number of slight increases all along the line. Even copper, which took a rise then fell back again, is destined to plunge back. All metals will rise if we get into a satellite race. Many wage scales take another jump this month.

Shifting sands

Roy Kimberlin, manager of the Central Pacific District of Graybar Electric and a director and since March 1956 voting trustee of Graybar, retires Jan. 1 and will be succeeded by G. L. "Bill" Call, formerly of Portland and Seattle and most recently district manager of the Cincinnati office. Kimberlin started in 1922 as a sales record clerk in San Francisco, later was manager of the Salt Lake City house, then St. Louis. Call started in Dayton, served in Portland in 1929, returned to Seattle after miliary service, then went to Akron in 1953.

They return

Don Hitchcock, another well-known Westerner in Graybar, retired as manager of the Denver house and will possibly return to live in the San Francisco area where he served for so many years. (As did Al Nichol, Graybar ex-president.)

Revision passed

Chapters sponsored by the National Electrical Contractors Assn. were voted at the convention in Cincinnati in mid-November. The new program, rewritten from the "branch plan" that met opposition and was postponed at the 1956 San Francisco convention, now incorporates some safeguards for the existing chapters. Sponsorship must be approved by chapters already chartered whose geographical area is involved; also be approved by the district vice-president. Final action must be taken by the executive committee. Sponsored chapters would have a limited operation under national office control, then be transformed into an autonomous chapter. There was no opposition to the modified program.

Tangle court

A National Joint Board for settlement of trade jurisdictional disputes, binding the membership to abide by the decisions of that board, was approved at the NECA convention. This seems a sensible procedure to eliminate conflict to the detriment of the ultimate consumer over overlapping work jurisdictions.

Confirmed

As expected the Western vice-presidents were elected. J. D. O'Connor, Luppen & Hawley Inc., Sacramento, succeeded Rollie Goold of Stockton as vice-president of District 9. W. P. Robbins was approved by the executive committee to fill the vacancy caused by resignation of Ralph E. Johnson, Sturgeon Electric Co., Denver. Robbins is a past vice-president; comes from Central Electric Co., Salt Lake City.

Realistic loading

Heavier loading on 100-amp services is now being permitted by the city of Los Angeles after the Department of Water & Power studies of diversity in all-electric homes showed that it could be done safely. This matter is under consideration for revision of the National Electrical Code, many utilities contributing studies on diversity.

Long needed regulation

A section dealing with plastics and including those used in luminous ceilings or for interior finish is expected to become a part of the 1958 Uniform Building Code. The research committee of the Building Officials Conference is working on it now.

Hi-cycle streets

High-frequency lighting is being tried for fluorescent street lighting in Detroit. The 60-cycle power input is converted to 360 cycles by two units consisting of magnetic frequency multipliers and a power factor correction unit. The new Power Groove lamps are used in six of the 15 two-lamp, 6-ft luminaires. Ballast weight is reduced and light output increased from 13 to 18%.

Sign of growth

A new local No. 2000, IBEW, has been set up in Yuma under District 7 of the union. A division of the Arizona Chapter, NECA, is the bargaining agent for the contractors of that area.

Invest where there's work

Union pension funds are being invested in the financing of home building, Charles J. Foehn, business manager of Local No. 6, San Francisco, announced last month. Of the $30,000,000 being invested, the San Francisco Bay area has had some $6,000,000 invested in new homes around the Bay area. The funds, said Foehn, relieved the tight money situation and also provided jobs for many of its members.

Another pioneer

Gustave W. Forsberg, pioneer Salt Lake City electrical contractor, died, age 78, Nov. 4. He had long ago retired and his business has been operated by his family. Mr. Forsberg started contracting in 1903 when he organized the Wasatch Electrical Co. He served as president of the Utah Electrical League 1930 to '33.

Golden celebrants

Two Bay area pioneer contracting firms celebrate their 50th year. Central Electric Co., started by Joseph Carlson in 1907, held a dinner for its executive employee staff Nov. 25 to celebrate the event. Everett Carlson, son of the founder, presided. . . Pacific Electric Motor Co. in Oakland likewise celebrated its 50th anniversary issuing a handsome brochure setting forth the history of the firm and its present-day scope of activities. Tracing its history back to a small motor shop owned by R. H. Conrad (still active in his own business in Oakland), the company is now run by William E. Boyd, son of Frank E. Boyd, who joined the company in 1928.

More Housepower

Electrical contractors in Boise have instituted a Housepower contest. A half-page ad announces a free wiring job. The contest is connected with a free Housepower rating and the offer of $200 worth of free wiring carried with it the promise to pay that amount in cash should a person having a home rewired be the winner.

School inspectors?

A plan to set up an inspection department in the state architect's office of California, which would cover electrical and mechanical inspection of all schools, was submitted to the field committee of the advisory board of the construction industry legislative council recently. The suggestion, made by Anson Boyd, was that a pool of inspectors be established by the state architectural department. This department would likewise check all plans and specifications prior to building. The proposal is under consideration.

Computing estimates

Ralph Johnson's book "Electrical Construction Cost Manual" is announced by McGraw-Hill as available. The 448-page, well-illustrated book by Johnson, president of Sturgeon Electric Co., Denver, is an outgrowth of his "Estimatic" system described last year in these columns. The book establishes fundamental methods for installing electrical work in various types of construction, develops standard assemblies, sets up unit costs covering material and labor for such assemblies and gives a detailed estimating procedure for applying the unit costs. It also contains graphs to supply source data for labor costs and tables to interpret these for estimating. Book sells for $10.

Simplify, please

Too many lamp types again. Back in the early 30s lamp manufacturers simplified their lines to standard types. Now the situation has become very complex again. NAED has asked manufacturers to make only one kind of 40-w lamp, one that will work on both preheat and rapid-start circuits and to study possible ways for further simplification.

Self-protecting

Fluorescent ballasts with built-in thermal protection are now available. This is a measure to stop the burning up of ballasts. Advance Transformer Co. calls its line "Advanguard."

Do you know—

Sent for your RLM specification book yet? You ought to know the difference between the 960 different types of RLM reflectors that can carry the label. The booklet gives very clear distinctions and tells who makes the various types. It can save you argument and loss of time as well as expense when ordering exactly what is specified.

A leader taken

Dave A. Smith, well-loved and respected distributor, president of Graham Reynolds Electric Co., died suddenly Nov. 20 of heart attack. He had always been very active in wholesaler and industry affairs in California and particularly the Los Angeles area.

Sort of an orphan

There was talk of the New Mexico Chapter, IAEI, being made part of the Southwestern Section of the inspectors' association. Far removed from the center of the Western Section to which it now belongs, it was thought its interests and conditions were similar to its neighbor in Arizona. So far it is merely talk.

Tribute trip

Honor was paid to another pioneer couple, Mr. and Mrs. Seth Cohn of Atlas Electric Co., San Mateo, at the first luncheon of the Southwestern Section, IAEI, in Phoenix. It was to celebrate their 57th wedding anniversary that the Peninsula Electrical Contractors Assn. sent the Cohns to Phoenix as its delegates.

Big ad fund

Contra Costa County's Joint Industry Board funds are being put to work to advertise Housepower and electrical construction. The trustees for the fund for the county, consisting of contractors and union representatives, have retained the services of the Joe Connors advertising agency to carry on a newspaper campaign in daily and weekly papers of the county. The advertising fund will have $20,000 to expend for this purpose.

Western winners

First-prize winners in the West for the 1957 international lighting competition sponsored by NEMA's National Lighting Bureau and three McGraw-Hill magazines are: Robert J. Huff, San Diego Gas & Electric Co.; Donald L. Roberts, Arizona Public Service Co.; Fred G. Kirshobel, San Francisco Lighting & Supply Co. Second-prize winners were Dana D. Corrough of Stockton and Scott Beamer, electrical engineer, Oakland. Hal Strahn, Los Angeles Department of Water & Power, won an honorable mention.

First joint board

In Pocatello the union agreement between Local 449 and the NECA has been opened up to negotiate a joint board clause. The payments begin Dec. 1. This is the first in the Intermountain region to be so set up although others are pending.

Bigger plans

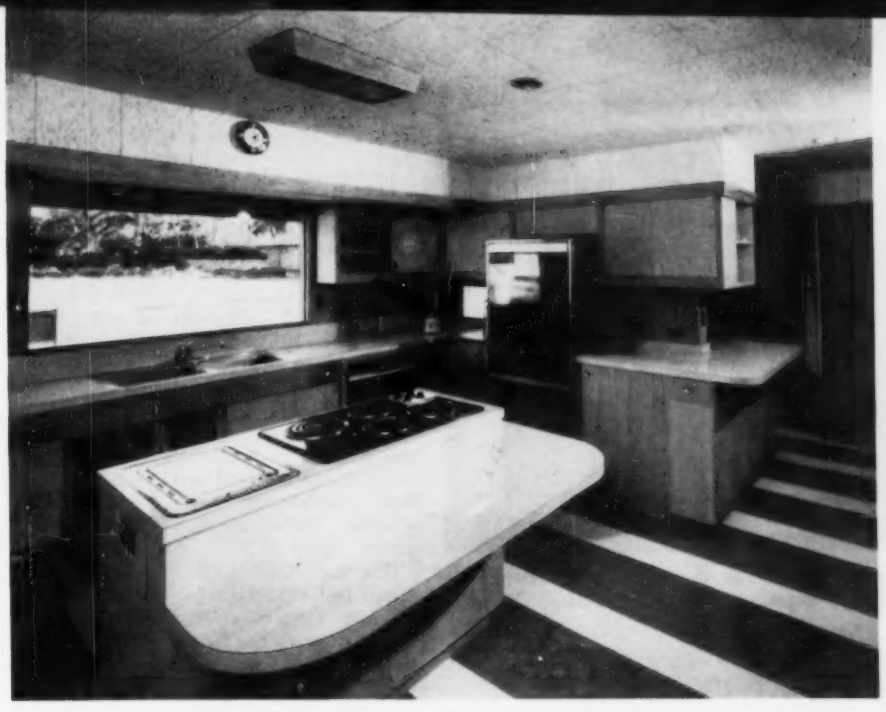
Day-Brite Lighting Inc. of California plans to build a new manufacturing plant for lighting fixtures on land just purchased near Sunnyvale, Calif. This was announced by Stanley M. Bixler, vice-president of the wholly owned subsidiary of Day-Brite Lighting of St. Louis. The company already has a small assembly plant in Santa Clara. Purchase of 15 acres and option on 15 more indicates the size of the projected new plant.

Hear this

Among people—Leonard A. Hobbs has been re-elected to the board of trustees of RLM Standards Institute Inc. He has long served on the board and at one time was secretary. . . . Lewis E. Long, Wagner Electric Corp., has been moved from Los Angeles to become branch manager in San Francisco. . . Edward C. Sylvanus, consulting electrical engineer, recently moved to new engineering offices at 3038 Rowena Ave., Los Angeles. . . Daniel Rashall has joined Nu-Lite Fluorescent Mfg. Co., Los Angeles. He was formerly national sales manager for Sunbeam. . . George Billinger, Sylvania Electric Products, has been made resident representative in the San Diego area.

Reins changed

Election time again among inspector association chapters. Eastern Washington Chapter: William S. Pufahl, Coeur d'Alene, was named chairman; Ernest E. Buchanan, Ephrata, vice-chairman; and Roy Crosby, Washington Water Power Co., re-elected secretary-treasurer. Executive committeemen are Roxie Countryman, state inspector, Gene Bigger, Russell Smith and Lester Miller. W. L. Gaffney of the Northwestern Section, secretary-treasurer, was presented honorary life membership.



Electrical appliances were a must in the Hawaiian Parade but they could be built in or freestanding and optional for the buyer. Note the many convenience outlets

Built-in baby sitter connects with every room to keep mother in touch

A Bigger Parade At Hawaii

Success of a five-home all-electric Parade at Honolulu last year brought a repeat performance in 1957. But this year there were 25 homes and they were inspected by 123,300 people, more than three times the number last year.

Sponsored by the Electrical Living Committee of the Pacific Coast Electrical Assn., Hawaii, and the Honolulu *Advertiser*, the homes were designed to demonstrate "how you can live better electrically." Requirements for builders entering homes in the parade included (1) that they be equipped to the absolute maximum with electric appliances to demonstrate adequately the advantages of being able to live better electrically; (2) that they be wired and lighted according to the general specifications with a minimum of 100-amp service and include range, water heater and dryer circuits approved by PCEA.

Qualifying homes received a certificate bearing the LBE symbol and attesting that the wiring installation provided for an electric range and water heater, present and reasonable future electrical needs, full convenience and efficiency from lighting and appliances, maximum flexibility in the use of portable lamps and appliances, and that it complied with the standard of the Certified Modern Home Wiring Committee of the PCEA, Hawaii.

A freestanding appliance gets the built-in look in this step-saving kitchen

Light for beauty and seeing was a specification in this beamed living room

A monthly winner in the Daily Double-A is Dan Linticum (left), lineman in Big Bend. Others are Gene Watson, Stanley Lickfold and Ralph Webster

WWP builds load and everybody profits when . . .

Tipsters Boost Sales

That a power company employee in a hard hat or his fellow worker at a desk can be a powerful ally of the full-time salesman has been proved again in Washington Water Power's current "Double A" tip campaign.

Although employee prospect drives are not new, this one's success (397 major appliances sold in seven weeks) merits another look at this method of boosting the sales curve.

The campaign puts the emphasis on major appliances and details were carefully worked out. The tip form given to WWP's 1,200 employees through departments and divisions is an 8½x11 sheet, folded and perforated, and providing for complete follow through and report. It gives the contest rules; has a detachable coupon for a chance on the monthly prize (a portable TV); provides forms for the tip, the salesman's report and the supervisor's file.

After the employee has filed his tip, a member of the sales department calls on the prospect to see if he is really interested in buying. If he is a sales department prospect form is filled out and sent to a dealer in the regular manner. If the customer prefers a particular dealer or contractor (and the WWP representative tries to find out) the prospect form goes to that firm. If not the company rotates them.

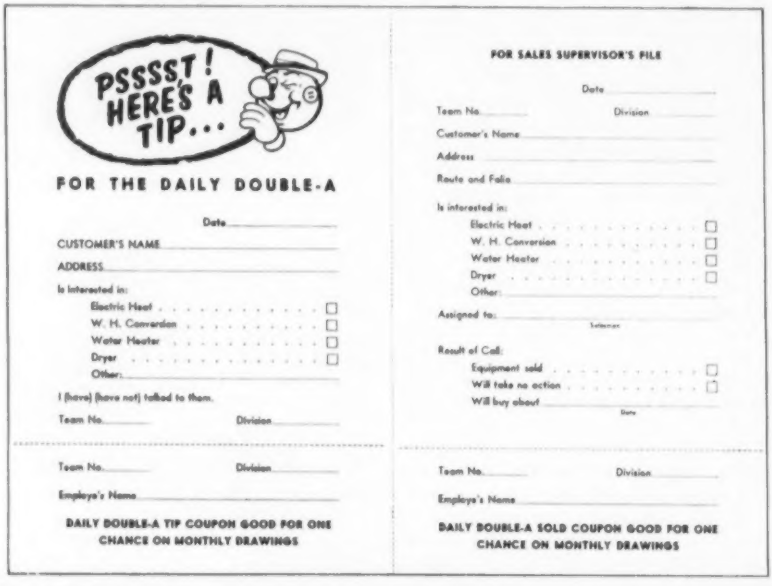
The program, now in its fourth month, is getting excellent participation from all departments and divisions, according to W. A. Lowry, WWP residential sales supervisor.

Far more successful than anyone in the company thought it might be the program is virtually swamping the sales department with prospects, he continued. In the first five weeks employees turned in 1,586 tips, of which 881 were followed up for 278 sales (31.6%). The first seven weeks brought in 2,016 tips (an average of nearly two per employee) on which 1,231 follow-ups netted 397 sales. The difference between tips received and follow-ups is only the normal lag in processing them through the sales department, Lowry pointed out.

He said that in the Spokane division, which includes about half of the company's customers, some 60% of the tips have been for electric heat and electric water heater conversion. Dryers too have been popular.

Electric heat is the number one item, followed by water heaters, including conversion to high wattage and replacement. These preferences are interesting when one considers the full-scale electric heat promotion started by the company early this year and a more than 90% saturation on electric water heaters in the WWP service area.

The program was slated originally for four months but it may be extended if interest keeps up. WWP's Big Bend division, headquartered at Davenport, Wash., was the most active at the start and in an early report had turned in an average of more than 7½ tips per employee; had a 52.3% average for sales on tips worked. But every department has its tipsters who are helping the company build load by boosting dealer sales.



First and third page of the contest tip sheet. The other two pages list the rules and leave space for a report on the sales call made by a company representative

Simplification proposed in

Water Heater Sizes

A list of 10 electric water heater models and heating element combinations believed to meet the need of 75% of the industry has been announced by a special study group of electric utilities and water heater manufacturers.

The proposed series of models was selected from the more than 200 combinations of tank sizes and wattages of electric water heaters now needed to meet power supplier requirements. If adopted by individual power suppliers, the new sizes would aid in the solution of problems now faced in the production and distribution of this appliance.

The 10 electric water heater models included in the study group's recommendation would embrace four tank sizes, six combinations of upper and lower heating element wattages, and four styles as shown in the accompanying table.

Recommendations of the study group have been referred to members of the Electric Water Heater Section of the National Electrical Manufacturers Assn., to electric utilities and other interested groups for consideration and action.

The proposed recommended list of electric water heater models is the first of a three-point program initiated by a Special Electric Water Heater Study Group working independently of any official association.

Recommended List of Electric Water Heater Models

Tank Size Gallons	Model	Lower Element Watts	Upper Element Watts
30	Round NEMA	600	1,000
40	Round	4,500	4,500
40	Table Top	4,500	4,500
40	Shell-Less	4,500	4,500
50	Round NEMA	1,000	1,500
50	Round	2,000	4,500
50	Table Top NEMA	1,000	1,500
50	Table Top	2,000	4,500
80	Round NEMA	1,500	2,500
80	Round	3,000	4,500

Salinas Valley appliance dealers got 6,700 prospects from home show that proved . . .

Teamwork Pays Off

Salinas Valley put on a home show this year that left dealers more than happy and the public asking for "two of these a year." Teamwork turned the trick for this third annual Salinas Valley Home Show and brought out 6,700 spectators in two days (one of them stormy), with lucrative on-floor sales and a good prospect list for winter business.

The show was sponsored by the Salinas Valley Appliance Dealers Assn., Pacific Gas and Electric Co. and the Salinas *Californian*. Commenting on its success, Ellis B. Langley Jr., PG and E dealer representative, said that actual reports of sales made on the floor during the show and for five days after total a gross of $22,618. "And most business developed from a show like this is on a long-range basis," he added.

Sponsors got to work early, had a first committee meeting six months before the show and periodical meetings thereafter to keep up interest and see to the hundreds of details in staging such an event. The day before the opening, there was a breakfast and final rally for the 24 exhibitors.

Each dealer was asked to man his booth continually and to have action—requests that were met without exception. A total of $2,500 in prizes was given away at hourly drawings, with a sweepstake each night. A special clothes dryer promotion, which was introduced at the show and ran until Nov. 15, offered a dryer to the entrant who guessed closest to the weight of clothes handled by a homemaker (without a dryer) in the course of a year. Before the ticket supply was exhausted, 2,000 entries had been received at the home show alone.

The show was supported by a barrage of newspaper advertising and publicity. Every day for three weeks before the opening an exhibitor's picture and the prize he was donating was run in the news section. The day before the show all these pictures were reproduced in a full page color ad. Photos of the crowds and names and pictures of winners kept publicity at peak effectiveness, three and four days after the show.

Appreciation for the work of PG&E staff members was expressed publicly by the appliance dealers through President Harry Bock.

Thirza Schenk talks to group of homemakers at one of the Los Angeles . . .

Public Service Programs

A homemaker's service program that includes special sessions for organized groups as well as public demonstrations is offered by the Los Angeles Department of Water & Power under direction of Thirza M. Schenk, program coordinator.

The department's new Van Nuys Service Center, with its well-equipped demonstration kitchen, is available to groups during the morning. Bookings are made for 9:30 to 11:30, with a half hour coffee time preceding an hour and a half program put on by the department's home service staff. A skit, "A Morning With Electra," shows happenings in the life of a typical homemaker and gives suggestions for entertaining, preparing everyday meals and laundering new fabrics.

Three programs—"Fashions in Fabrics and Appliances," "Treats and Tricks with Portable Appliances" and "Freeze and Cook Some Spare Time for Yourself"—are given outside department buildings on special request. These are accepted Consumer Education programs for PTA groups.

On the second and fourth Fridays of the month the 9:30 to 11:30 hours are reserved for the general public. Instruction on proper care and use of major appliances and new trends in food preparation are given at those two morning sessions and on the first Monday evening of each month. Other special public demonstrations are arranged from time to time, with a view to particular needs or events. Patriotic holiday entertaining was the subject for June 14, for instance, with a talk by an American Legion speaker on the evolution of the flag.

The utility is cooperating with the Recreations and Parks Department in another public service program at Westchester Playground on the second Friday morning of each month. These programs, keyed to the needs of young homemakers, include such varied subjects as electronic cooking, table settings and decorations and Christmas gift wrapping. Guest speakers supplement the department home economists, Genevieve Singler and Wanda Pinta.

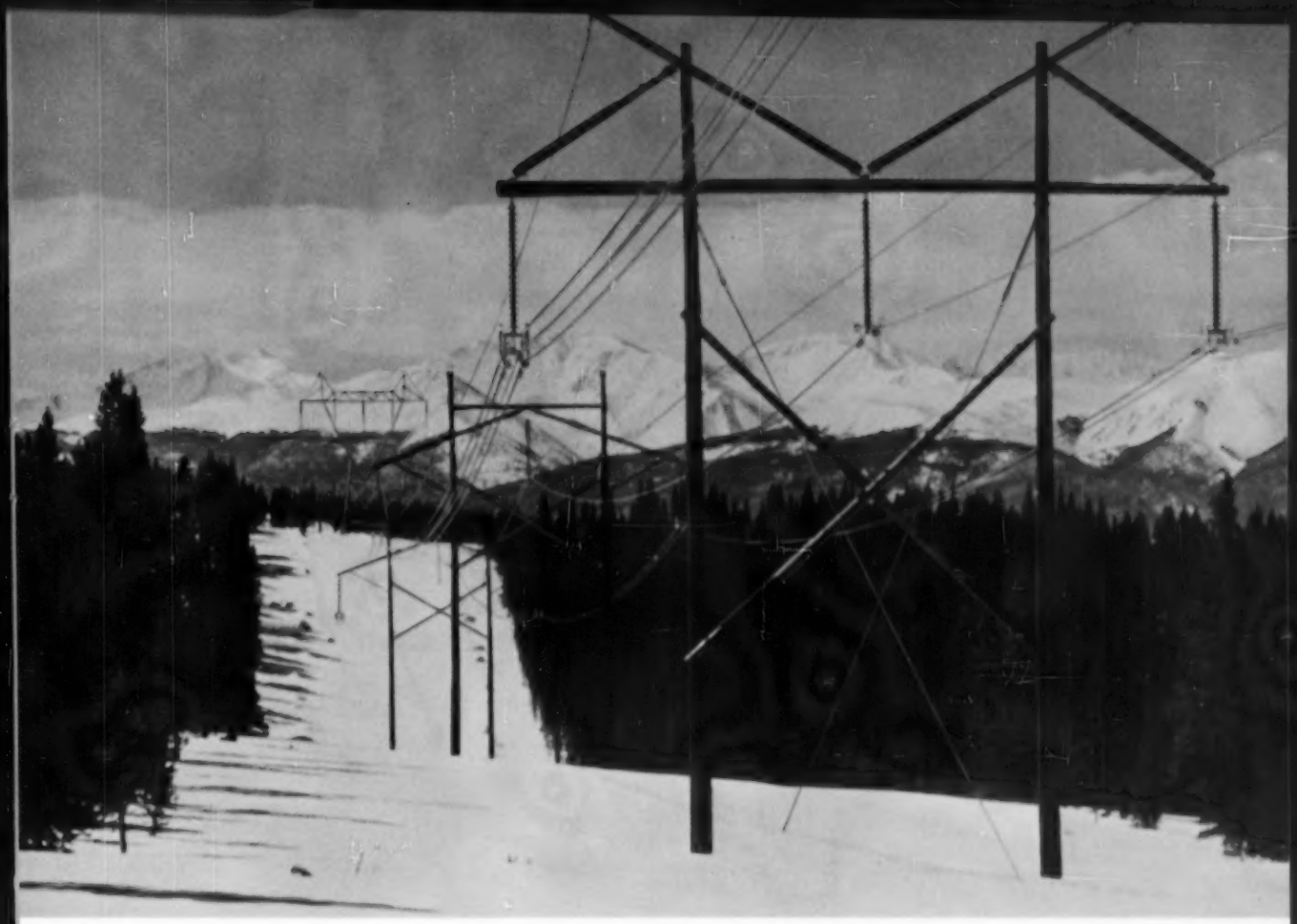
New Appliance To Be Tested in the West

To be introduced in eight Western states in December, General Electric's rotisserie oven will be available only in the West until early 1958. M. M. Wheeler, regional sales manager for G-E's portable appliance department, said that Western market tests would be used for national application as in the case of the coffee maker, which also was distributed first in the West. Even when the rotisserie is put into other markets, the West will be kept supplied, he said.

The new appliance combines features of rotisserie, broiler and oven. Its control panel has a thermostatic oven control for baking and roasting, a Telechron electric timer and a three-way pushbutton selector. It has two Calrod heating units and a chrome-plated interior for easy cleaning. The body is coppertone with a satin finish aluminum lid and glass panel window. Interior dimensions are 18x13¼, large enough to hold an 18 lb turkey for roasting or a 16 lb turkey in the rotisserie. The oven operates on 120 v, 1,500 w a-c and carries a recommended retail price of $89.95.

Listing the reasons for introducing the rotisserie in the West, Wheeler pointed to the large market with customers that are willing to accept new products; the many types of markets to be found in this region; the fact that the West is far removed from the rest of the nation's marketing areas by natural boundaries and merchandising tests are not affected by other parts of the country; the variation in population density, which allows testing in large and small communities; the climate variation, which permits marketing tests to measure a wide range of cooking habits.

Monte Wheeler, G-E Pacific region sales manager, portable appliance department, shows the new rotisserie oven, which is being introduced in eight Western states after five years of market research



Laboratory high in the Rockies searches the unknown to bring about

Tomorrow's supervoltage transmission lines

High in the Rocky Mountains west of Denver, men are at work on a project that promises valuable benefits to the entire electric utility industry.

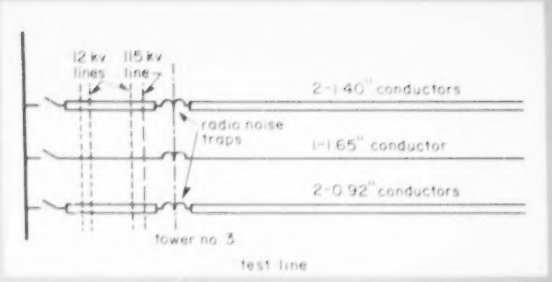
There, Public Service Company of Colorado, in cooperation with Westinghouse and other company manufacturers of high-voltage equipment, has created a giant outdoor laboratory.

Their purpose: to study and measure the elusive phenomena of corona and radio influence, and establish facts upon which the supervoltage transmission lines of tomorrow can be designed.

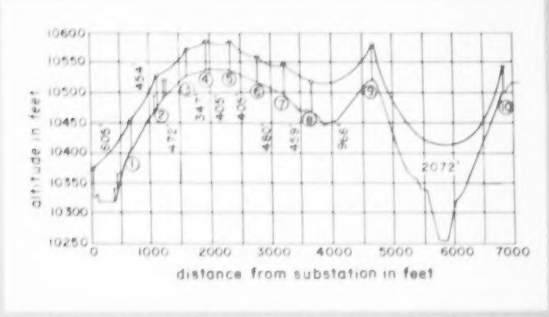
Photo at left shows Harry Morgan, Westinghouse Sales Engineer, discussing some of the equipment under test with L. M. Robertson, Chief Electrical Engineer and sponsor of this project for Public Service Company of Colorado.

YOU CAN BE SURE...IF IT'S

Westinghouse

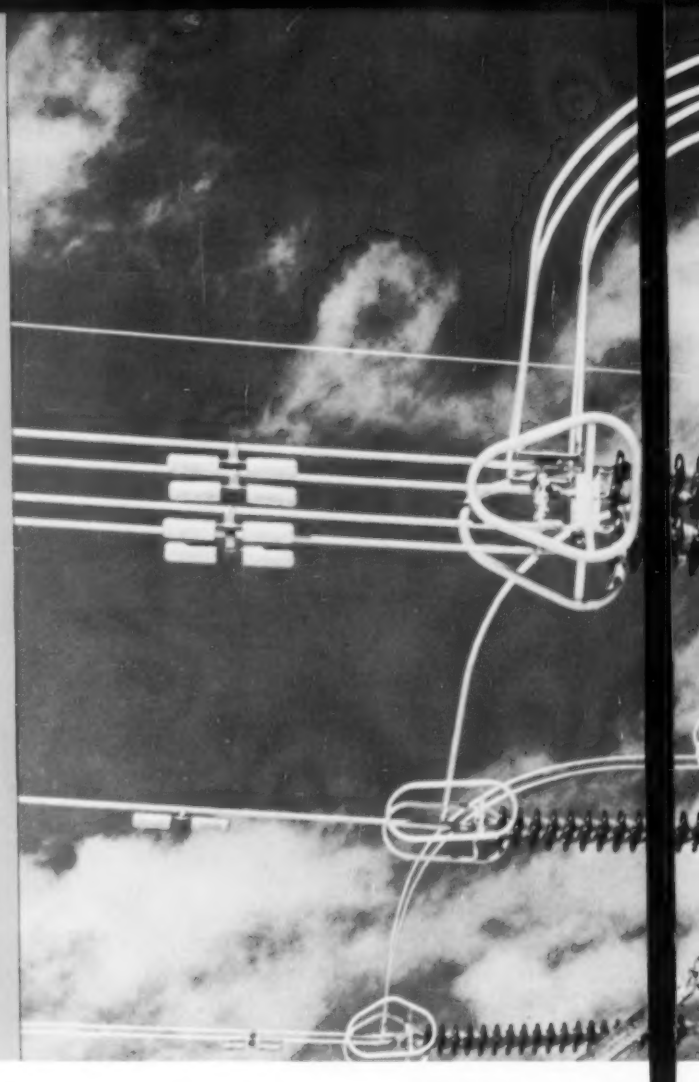


Schematic diagram of conductors as they will be tested, showing the radio noise traps at Tower No. 3 to isolate the test line from radio influence of nearby transmission lines.



Profile of the Leadville test line illustrates altitude of tests. Note foreshortening of distance from substation.

Close-up of Tower No. 3, high over Leadville. Largest conductor is the single conductor in the middle, a duplicate of Tidd conductors. The four-bundle in the foreground is medium size, later to drop to two-bundle for testing. The two-bundle conductor in the background is the smallest line size under test.



500,000-volt corona tests are now underway in the Colorado Rockies

Extra-high voltages will be required for economical transmission of the electrical industry's rapidly mounting energy requirements. Westinghouse is now prepared to supply much of the equipment required to handle these voltages. But the entire industry is aware that additional information is still needed regarding corona and the resulting energy losses, as well as the radio influence it creates at high altitudes.

The AG&E tests at Tidd Station made great strides. Additional performance data gained at Leadville, it is hoped, will make ehv practical not only system-wide, but nationwide.

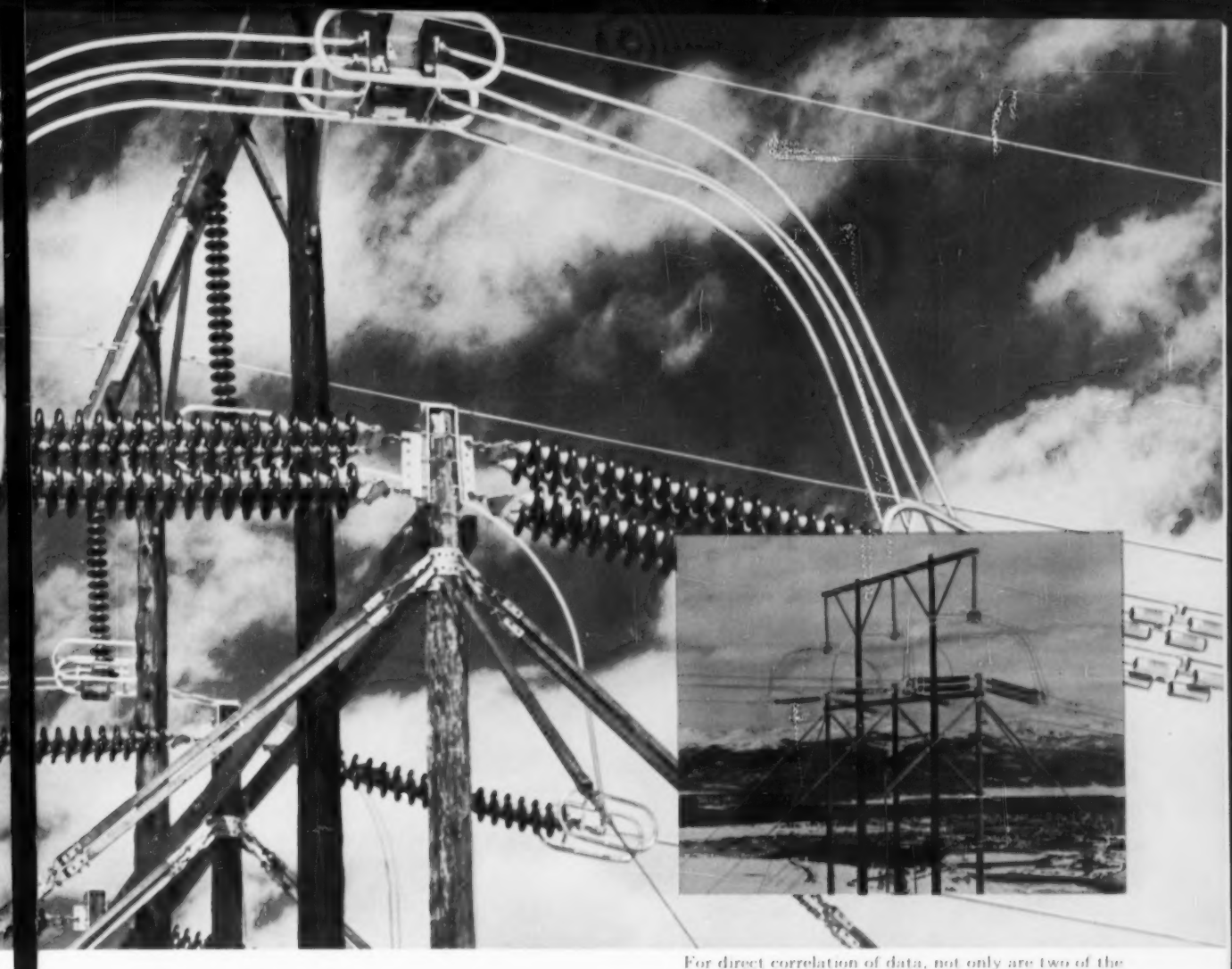
With line construction and instrument calibration now completed, Public Service Company and its collaborators are embarking on the actual tests, ranging upward from 173 to 500 kv.

Towers carry three single-phase circuits, data later to be correlated to three-phase. Circuit No. 1 bundles four 1.40″ conductors. No. 2 carries one 1.65″, and No. 3 bundles two 0.92″. All conductors except the latter are expanded ACSR.

The four-bundle circuit, having adequate conductor for zero corona at the voltages under test, served to develop reliable data for instrument calibration. On completion of calibration, this circuit will drop one line to run brief tests as a three-bundle and, finally, will drop one-third to get comparative data with two conductors.

Energy loss and radio influence will be measured under violent extremes of weather

The test site at Leadville was selected because the altitude averages 10,500′, with temperatures ranging from high 80's to 30° below. Test lines are sub-



For direct correlation of data, not only are two of the conductors designed to duplicate Tidd tests, but the Westinghouse transformer, arresters, disconnects and measuring equipment were shipped directly from Tidd to Leadville, Colorado.

ject to wind velocities, rain, snow and atmospheric conditions that would be difficult to simulate for components in a laboratory; impossible to recreate for an entire transmission line. Existing data concerning the effect of altitude (low barometric pressure) on corona are based on work with relatively small conductors in evacuated chambers.

Two-mile high Leadville tests will extend knowledge gained in Ohio Valley Tidd Project

No. 2 and No. 3 circuits at Leadville, carrying one 1.65″ conductor and two bundles of 0.92″ conductors, are designed for direct correlation with data gathered on these conductor sizes at Tidd Station. The Westinghouse substation equipment transformer, arresters and disconnects were originally furnished for the Tidd tests. At the conclusion of the Leadville test, this same equipment will be used in the AEIC high-voltage cable test program.

YOU CAN BE SURE... IF IT'S

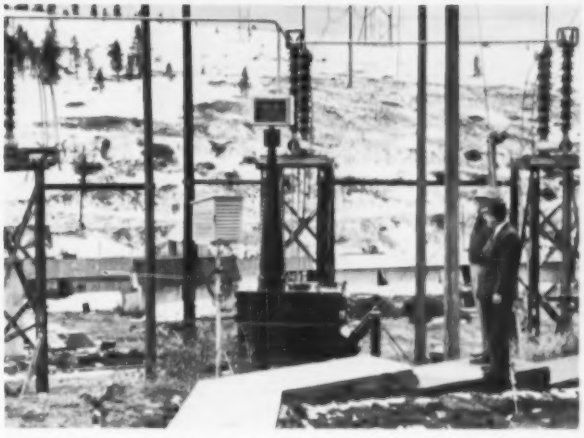
Westinghouse

Westinghouse

cooperates with Public Service Company of Colorado to move back transmission frontiers

Westinghouse is proud to be a member of the participating manufacturers collaborating with Public Service of Colorado. Some of the Westinghouse equipment furnished is shown here. But more important is the knowledge to be gained . . . basic knowledge for the benefit of the entire industry . . . unequalled experience in ehv equipment to influence designs of the future.

With this telescope located in the station house, Jim O'Neil takes a direct reading on the instruments on top of the transformer as a cross check on the recorder located in the "nerve center."



Harry Morgan of Westinghouse is shown with L. M. Robertson, Chief Electrical Engineer of Public Service, at the upper level of the substation. Note the instrument panel on high-voltage bushing which reports current and voltage at start of line.

LEFT: Nerve center of the "great outdoors laboratory." James O'Neil, Westinghouse Engineer, and Joseph Wissenbach, Communications Engineer for Public Service, are shown checking the charts that record: (1) conductor temperature, (2) air temperature, (3) dew point, (4) barometric pressure, (5) wind direction, (6) wind velocity, (7) line voltage, (8) line current, (9) corona loss in kw, and (10) radio influence.

RIGHT: Another of the double-check points. Jim O'Neil and Joe Wissenbach inspect the radio influence detection equipment located at the base of the main transformer.

LOWER RIGHT: Radio influence meters are located at various distances from line. To protect them against the extremes of weather, without damping their sensitivity, they are enclosed in temperature-controlled all-plastic huts.

YOU CAN BE SURE... IF IT'S

Westinghouse

C. F. WAGNER,
Consulting Engineer
Engineering & Service Dept.
AIEE Fellow; CIGRE

W. E. PAKALA, *Advisory Engineer*
Research Laboratories
Member: AIEE, IRE

D. F. SHANKLE,
Engineer-in-charge
Advanced Development Group
Member: AIEE Committee on
Switchgear
AIEE Standards Committee
NEMA Power & Communication Co-ordination Committee

J. K. DILLARD, *Manager*
Electric Utility Engineering
Member: AIEE Committee on
Transmission and Distribution
Chairman, AIEE General
Systems Subcommittee
Vice-Chairman, AIEE Committee
on Power Rectifiers

T. J. BLISS, *Engineer*
Electric Utility Engineering
Associate Member: AIEE

H. S. SHOTT, *Consulting & Application Engineer*
Electric Utility Engineering
Member: AIEE

J. E. O'NEIL, *Engineer*
Advanced Development Group
Associate Member: AIEE

B. J. SPARLIN,
Laboratory Engineer
Radio Influence Laboratory
Member: AIEE

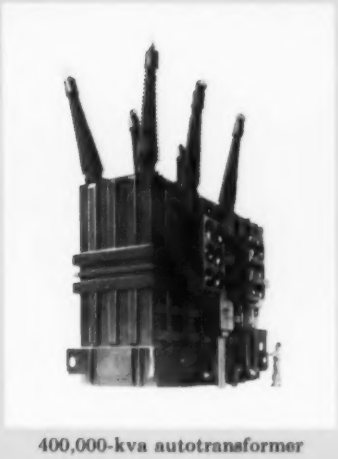
The Extra-High Voltage tests

. . . another example of the Westinghouse "Plow-Back" policy

It has been a consistent policy of Westinghouse for years, to invest time, talent and money in the development of new knowledge as well as new equipment for the industry. While tests continue in the High Voltage Laboratory in East Pittsburgh and in divisional laboratories throughout the company, proving out new equipment, research teams working with the nation's electric utilities explore the industry's unknowns.

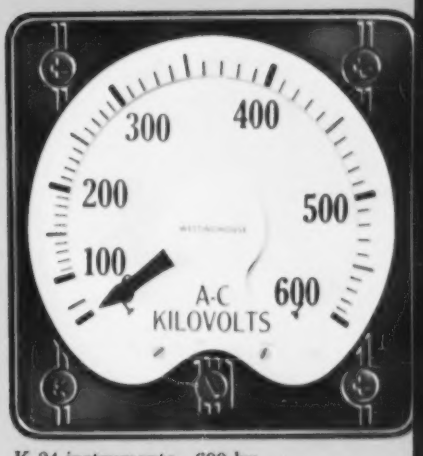
The Westinghouse engineers co-operating on the Public Service of Colorado tests are shown above.

YOU CAN BE SURE...IF IT'S Westinghouse



400,000-kva autotransformer

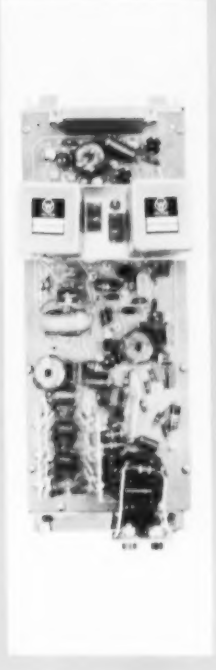
25,000,000-kva power breaker



K-24 instruments—600 kv

182-kv lightning arrester

Completely transistorized carrier

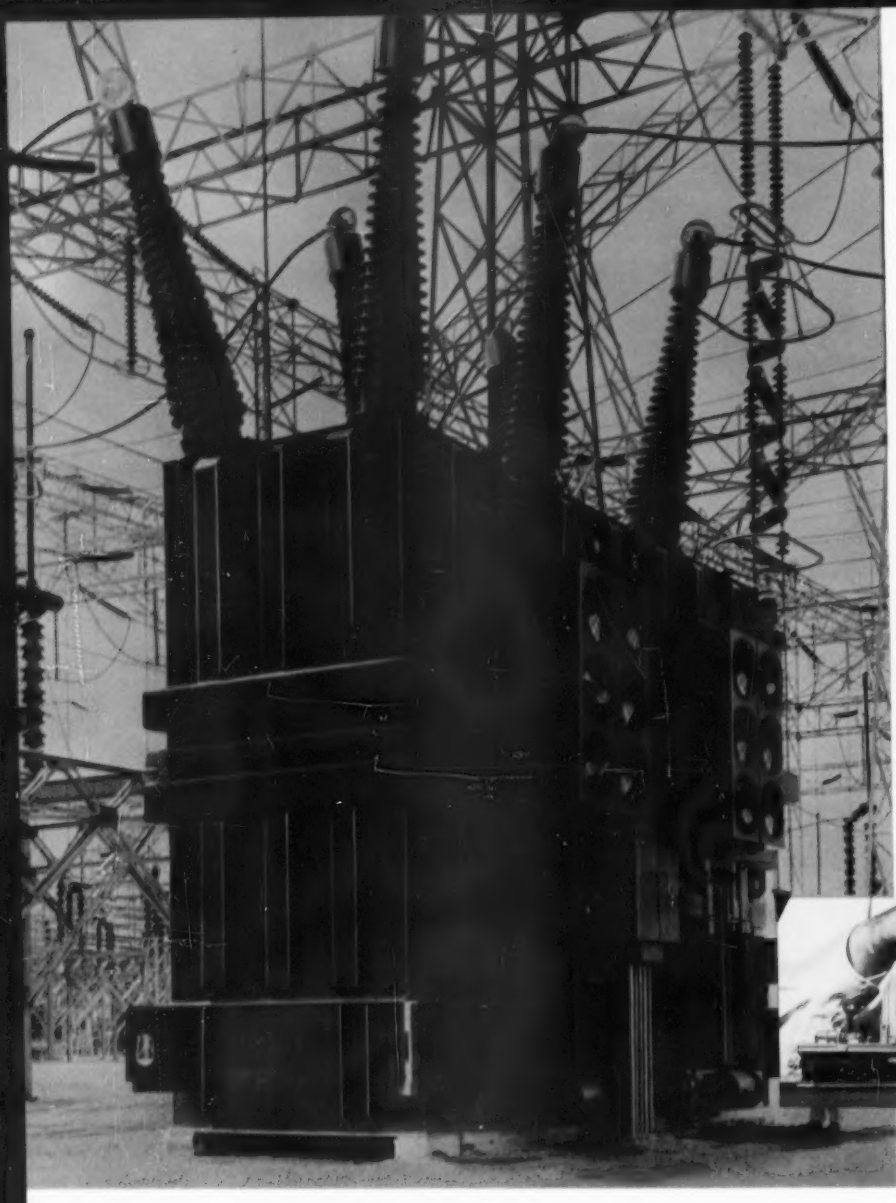


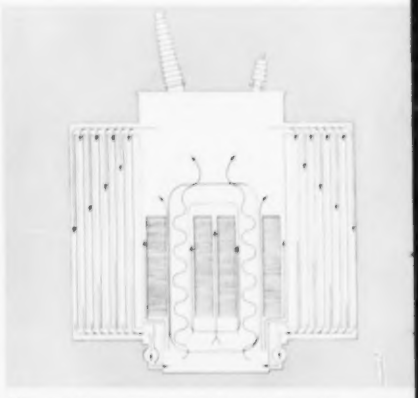
196-kv high-speed grounding switch

Type "O" Bushing—92-345 kv

The Westinghouse "Plow-Back" policy has already resulted in equipment now ready for supervoltage transmission

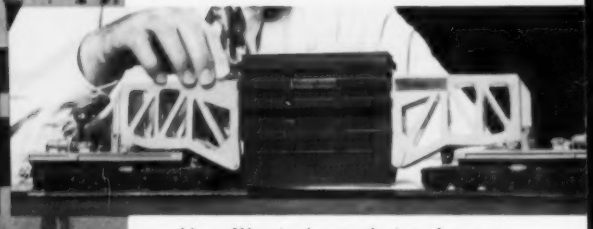
K-Dar compensated relay system





Close-fitting tank and vertical coil construction of Form-Fit transformers combine to form directed paths for coolant. Forced-oil cooling eliminates need for thermal head, provides maximum coverage of coil surfaces within minimum space.

Shell-form construction places core on the outside, coils inside for maximum mechanical strength. Solid insulation is used at high stress points; creepage surfaces eliminated.



New Westinghouse-designed transformer railroad car will permit more direct routing . . . faster delivery to help speed your construction schedules. With the transformer suspended only six inches above rails, and with a capacity of 250 tons, this car, the "Schnabel," provides additional room to grow . . . will permit transformers of the supervoltage era to be shipped in one piece.

From design to delivery...

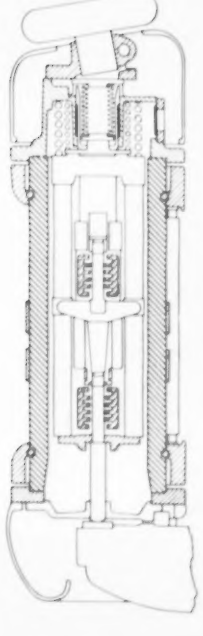
Transformers with room to grow meet the challenge of ehv* future

Extra-high voltage transmission of the future presents no problems for Westinghouse transformers. Utilizing the basic "Form-Fit"® design with forced-oil cooling, these transformers are both smaller and lighter per kva than any other design. Here is a design with room to grow . . . a principle that can be extended to any foreseeable voltage level . . . meeting the challenge of the supervoltage future.

Westinghouse can now build transformers with voltages practical for the next decade . . . voltages up to 380, 440, 500 kv or beyond.

*extra-high voltage

Westinghouse high-power laboratory made possible world's first 345-kv breaker, paved way for ehv



Developed in the Westinghouse high-power research laboratory, the tubular, multi-break interrupter made possible the world's first 330-kv, 25-million-kva circuit breaker. This development has made practical the extension of circuit breaker ratings into still higher voltages; it will pave the way for solution of problems involved in handling extra-high voltages . . . supervoltages of 500,000 and above.

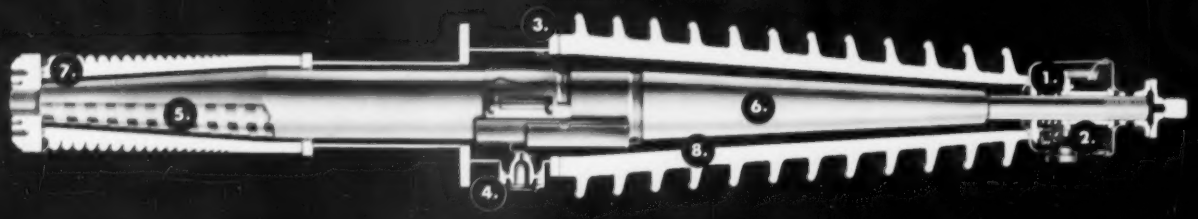
ultra-high-speed reclosing can be extended to ehv breakers

Trouble-free, trip-free service is provided by pneumatic operating mechanisms in Westinghouse circuit breakers rated to 345 kv. Both mechanically and electrically trip-free, breakers trip open in standard operating time when closed on a fault. Reclosing is fast—just 15 or 20 cycles. Automatic selection of trip-free or non-trip-free operating results in ultra-high-speed reclosing for larger breakers.

These are some of the benefits you can expect to find extended into the supervoltage future.

Now in use in breakers up to 345 kv, the tubular interrupter grids also have excellent line-dropping and capacitor-switching characteristics—proved in laboratory and field tests. *Additional tests have proved the performance of this interrupter at even higher voltages.*

YOU CAN BE SURE... IF IT'S Westinghouse



1. Compression spring assembly 2. Inert gas space 3. Concentric gasket assembly 4. Potential tap receptacle 5. Concentric foil layers 6. Oil-impregnated condenser 7. Porcelain arc shield 8. Porcelain weather casing

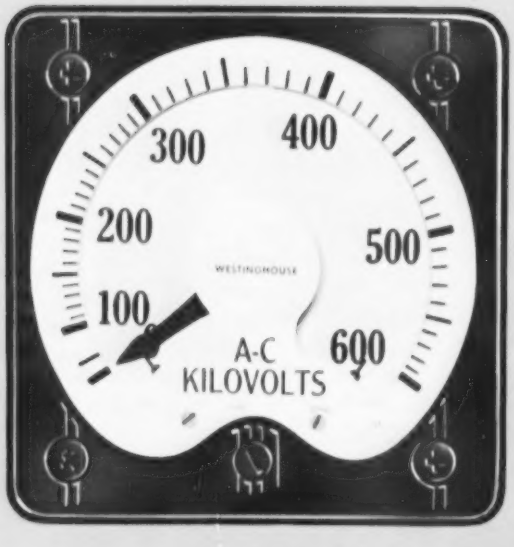
Fifty years' bushing dependability builds toward corona-free ehv

As demands on power equipment go up and up, so—ordinarily—do the problems of corona. But the Westinghouse Type "O" bushing used for breakers and transformers in the higher voltage range—92-345 kv—is far from ordinary.

The Type "O" bushing is corona-free. It has greater dielectric strength than any other bushing made; vacuum oil-impregnation of the condenser insures insulation with the highest possible strength in a minimum of space.

Westinghouse pioneered the condenser principle, has designed, built and improved condenser bushings for 50 years, building toward the era of supervoltages, building toward corona-free ehv bushings.

Seeing is believing with super-legible K-24 instruments



Important electrical data is gathered by accurate instrumentation . . . and costly errors must be avoided. Westinghouse K-24 circular-scale instruments—designed to help eliminate these errors—can be read at distances of 20 feet or more, at angles up to 65 degrees. Shadow-proof and glare-proof, the dials of K-24 instruments keep distortion of readings at a minimum.

The long scale, coupled with small flange area, increases readability and saves space—K-24 instruments can be grouped compactly in higher banks, do not have to be spread out at a lower level. K-24 instruments simplify one-man operation.

Accuracy for the future. This K-24 instrument dial for extra-high voltage applications provides a good demonstration of how great even the smallest error can be. Each division on the dial represents 10 kv. Excellent legibility practically eliminates chances of misreading dial.

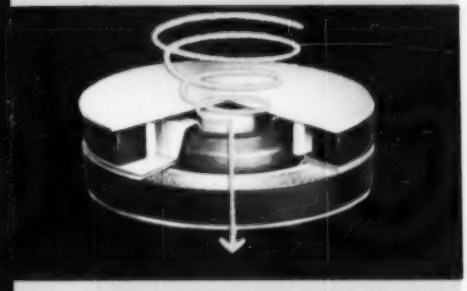
The new reduced-height type SVS arresters are self-supporting; installation is simpler—up to 300,000 pound-inch cantilever strength.

Westinghouse shrinks arresters, tailors height and performance to tomorrow's supervoltages

The constant increase in the physical size of lightning arresters resulting from ever-rising voltages could have caused a critical space problem. But Westinghouse engineering came to the rescue . . . developed an arrester design that not only reduced the height of arresters for present high-voltage ratings, but provided room to grow for the supervoltage requirements of the future. The height reduction—up to 45 percent—from this new design stems from physically paralleled elements, connected in series electrically.

At the same time, greatly increased operation due to switching surges called for a means of preventing pitting and other damage to the gap electrodes. This was achieved with development of the new Mobilarc gap, utilizing a radially polarized magnet which spins the arc around a longer path on the gap electrode surfaces. Due to the movement of the arc, the electrodes are not affected . . . maintain their original condition. Currents of 100,000 amperes have been discharged through the gaps without changing the permanent magnetic field.

These two developments have resulted in better performance packed into a smaller arrester . . . another example of Westinghouse designing for the supervoltage future.



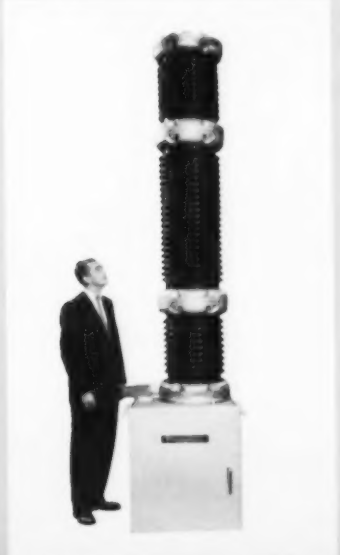
The Mobilarc gap safely spins the arc over the electrode, with no change in gap characteristics—even after 1,300 tests.

Faster, better protection for your transformers of the future

The new Westinghouse high-speed grounding switch closes in five cycles—six times the speed of conventional grounding switches. This revolutionary unit initiates a ground fault which trips remotely located circuit breakers, clearing the line before extensive transformer damage can occur. Closing time is minimized by locating the contacts relatively close together in a high-dielectric sulphur-hexafluoride (SF-6) gas atmosphere, and by providing reciprocal blade action instead of swinging action.

Contacts and mechanism are fully enclosed—impervious to weather. Speed and reliability are maintained even under conditions of severe icing and with temperatures as low as —40°F.

The grounding switch in ratings up to 196 kv is protecting today's transformers from damage. With the design principle of this switch, ratings can readily be increased as needed to afford this same protection to tomorrow's supervoltage equipment.



This 196-kv grounding switch is one of two built by Westinghouse for Pennsylvania Power & Light Company's Peckville substation. This unit is capable of closing a 20,000-ampere circuit in five cycles.

YOU CAN BE SURE...IF IT'S Westinghouse

Extra-High Voltage transmission puts new emphasis on reliable carrier communication

Accurate decisions in a utility have always depended upon quick, accurate transfer of information from remote locations to a central control point. With the increasingly high equipment investments in transmitting high voltages, the advantages of the Westinghouse power line carrier become even more important . . . whether the unit is for automatic remote *operation*, *control* or *protection*.

Completely transistorized with printed circuits, the Westinghouse carrier provides a new standard of reliability. In addition to remarkably low maintenance, this unit draws only one-tenth the conventional power, requires but one-twentieth the space. Interchannel interference virtually disappears, allowing more, fully reliable channels in the same band width.

A new concept in distance relaying

The advanced design . . . K-Dar system

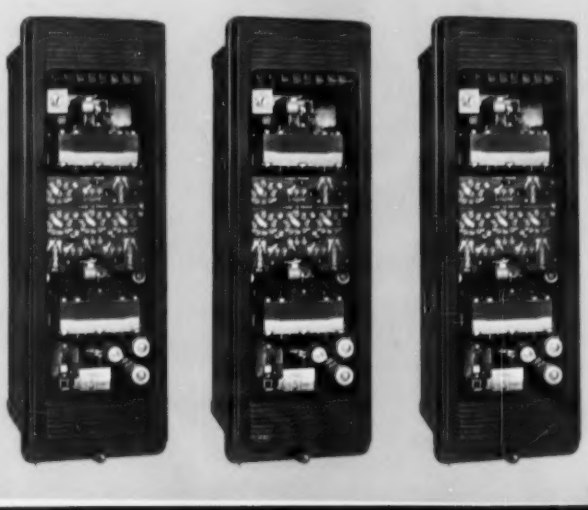
System interruptions on supervoltage transmission lines will be mighty expensive. Damage and outage due to sustained fault current cannot be tolerated . . . nor can the costly repair bill which follows.

The new Westinghouse K-Dar protective relaying system, combined with Westinghouse carrier or micro-wave, provides high-speed simultaneous relay operation at both ends of faulty line sections, permitting maximum service continuity, faster reclosing and improved system stability.

The K-Dar system is the result of wide application and design experience of Westinghouse engineers in Relay, Switchgear, Industry Engineering and associated departments.

The K-Dar distance relay system has a range of 0.75 to 20 ohms and can be set to protect 90 percent of a line section when used as a distance relaying system without carrier transmission. CP-1045

Advanced design, simplified settings, low-burden and high-speed operation add up to reliable protection, ease of application and low maintenance costs.



YOU CAN BE SURE...IF IT'S

Westinghouse

YOUNGSTOWN "BUCKEYE" CONDUIT

. . . protects wiring system of Cleveland's new $5 million air terminal

Highly functional—yet strikingly impressive, describes the new Terminal Building at Cleveland's Hopkins Airport. It's part of an $8 million improvement program that will restore Cleveland's position of national prominence in the air transportation industry.

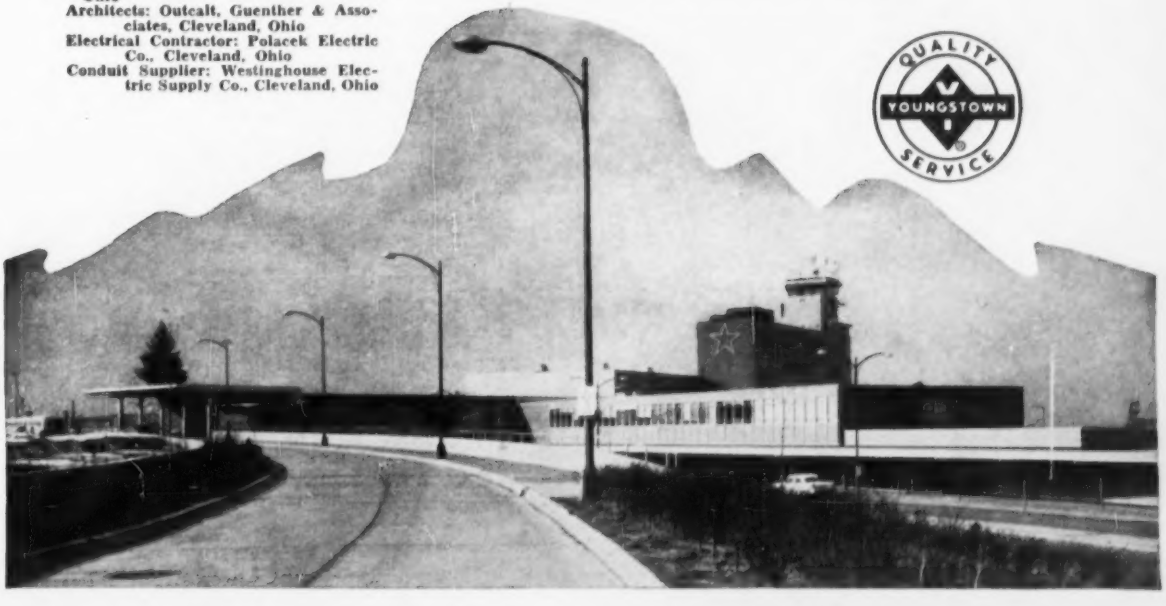
Planners of the airport's revitalization project wisely specified Youngstown's "Buckeye" Full-Weight Rigid Steel Conduit for life-time protection of the Terminal's all-important electrical wiring system. Electrical systems that fail to function properly are definitely a bad investment.

To keep your electrical systems functioning properly, specify quality-controlled Youngstown "Buckeye" Conduit. Satisfied users tell us, "It's easier to bend and thread — easier and faster to fish wires through, and due to its superior corrosion-resistance, gives a much longer, trouble-free service life."

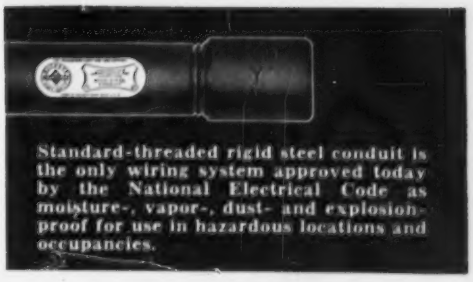
"Buckeye" Conduit is the specification of many leading building owners, architects and contractors—why not make it yours, now?

Leading distributors in the industrial and electrical markets carry complete and ample stocks for on-the-spot delivery to your job sites. They're awaiting your phone call—today.

Cleveland Hopkins Airport; Cleveland, Ohio
Architects: Outcalt, Guenther & Associates, Cleveland, Ohio
Electrical Contractor: Polacek Electric Co., Cleveland, Ohio
Conduit Supplier: Westinghouse Electric Supply Co., Cleveland, Ohio



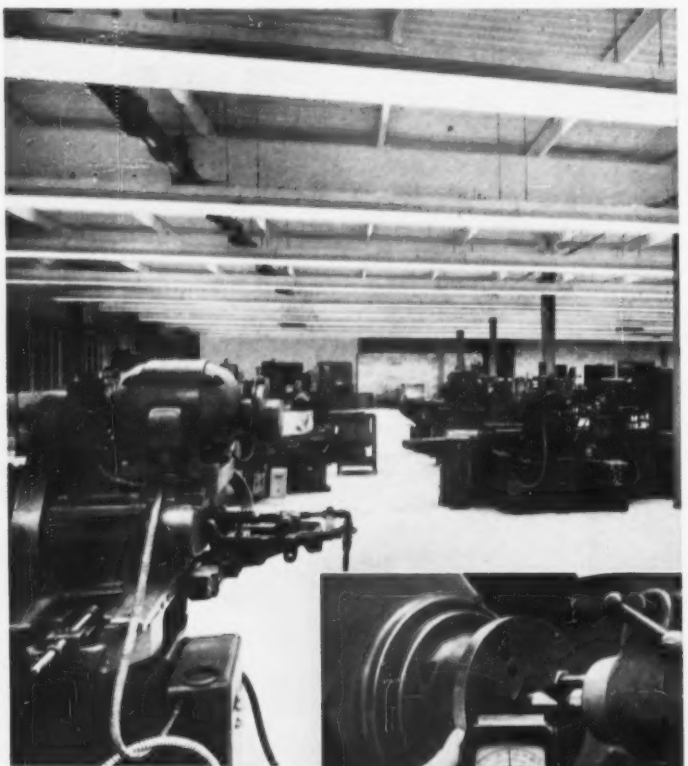
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities



Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

The Powerful Power-Groove!

Radical new General Electric fluorescent lamp design can give your customers higher, more economical light levels



AT ERICKSON TOOL COMPANY (above), 450 G-E Power-Grooves, eight feet long, mounted 10 feet high, with 10 feet between rows, maintain a lighting level of 160 footcandles economically. This means there is plenty of light right at the machines (see footcandle reading at right)—where extra light means extra safety, extra accuracy for workers. No supplementary lighting is needed. Powerful Power-Grooves do it all!

While plans for their new building were still in the early stages, officers from Erickson Tool Company of Cleveland, Ohio, visited the Lighting Institute—General Electric's lamp headquarters at Nela Park. There they saw the whole array of lighting methods and discussed the powerful new G-E Power-Groove Lamps.

They were shown how these revolutionary lamps provide outstanding general lighting, making it unnecessary to use supplemental lighting on individual machines (like that used by Erickson toolmakers in their old plant). They saw how powerful Power-Grooves would fill a plant with pleasant light that's easy on the eyes . . . as well as the pocketbook. The decision was made: Erickson's new plant would have G-E Power-Groove Lamps throughout!

Because G-E Power-Groove Lamps give nearly twice as much light per tube as High-Outputs—2½ times as much as 8-foot slimlines—your customers can get more light per fixture—with fewer parts to maintain. And compared to other fluorescent systems, they can save 5-20% on their initial investment.

Get the whole exciting Power-Groove story. Write General Electric Co., Large Lamp Dept. EW-127, Nela Park, Cleveland 12, Ohio. Better still, visit Nela Park and let us show you on-the-spot demonstrations of how the powerful Power-Grooves can work for your customers.

WORLD'S BRIGHTEST WORKSHOP—Now you can see powerful Power-Grooves in action . . . lighting the world's brightest workshop. It's at the G-E Lighting Institute at Nela Park. Plan to visit it and see for yourself.

Progress Is Our Most Important Product

GENERAL ELECTRIC

New Sears, Roebuck and Co. Store at Nashville has 178,961 sq ft of floor space. All wiring is protected by SPANG HD and SPANGLEAM EMT.

"SPANG® Conduit's easy handling saved us installation time"

says Mr. Leon Harlan, Ramsey Electric Co., Nashville, Tennessee

"We installed 77,170 ft of SPANG HD Galvanized Conduit and 59,000 ft of SPANGLEAM EMT to protect the wiring in the new Sears, Roebuck & Co. store at Nashville, Tennessee," reports Mr. Harlan. "Because it was so easy to work with, we saved considerable time on installation which also helped keep costs down.

"SPANG HD was easy to cut and thread. Bending was fast and accurate. The conduit was clean and free of burrs and obstructions which otherwise might have caused trouble on wire pulling.

"We used SPANGLEAM EMT for short runs, and we had good results with it, too. The EMT was delivered bundled with blue plastic tape instead of rope. This was an important safety factor, because the tape makes a strong bundle and lengths don't slip out of place."

59,000 ft of SPANGLEAM EMT, 77,170 ft of SPANG HD went into this store. Easy handling of conduit saved time, kept costs down.

You get top quality with SPANG

. . . because SPANG Conduit is made under *quality-control* conditions, and is tested and inspected before shipping to be sure you get a quality product every time.

If you've never tried SPANG, now's the time to start. Order it for your next job. You'll get quality service from your local SPANG Distributor, too.

Architect Engineers:
Stevens & Wilkinson, Atlanta, Georgia
General Contractor:
Foster & Creighton, Nashville, Tennessee
Electrical Contractor:
Ramsey Electric Company
Nashville, Tennessee
Spang Distributor:
Tennessee Valley Electric Supply Co.
Nashville, Tennessee
Harris-Patrick Electric Supply Co.
Nashville, Tennessee

SPANG CONDUIT

SPANG-CHALFANT

Division of The National Supply Company

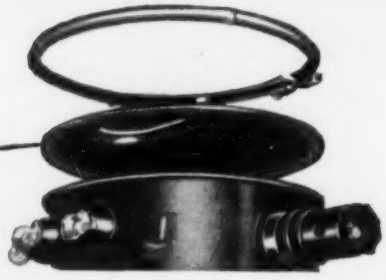
GENERAL SALES OFFICE

TWO GATEWAY CENTER, PITTSBURGH, PA.

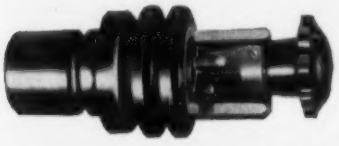
District Offices and Sales Representatives in Principal Cities

WAGNER FORM W Pole Type

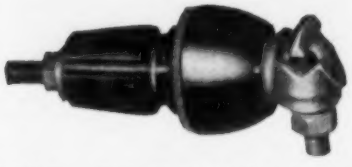
offer all the mechanical you need for EASIER INSTALLATION...



SHUR-SEAL CLAMPING RING
Sealing gasket, held in place by retaining ring on cover, is uniformly compressed around entire circumference. Keeps transformer sealed air tight . . . no atmospheric moisture or dust particles can get inside. "Breathing" is completely prevented. Yet the cover may be easily removed by loosening a single bolt.



HIGH VOLTAGE SIDEWALL BUSHING
Permits the use of either copper or aluminum conductor. Insulating knob is designed for safer, faster, easier connections, without tools. Porcelain and terminal are locked in position.



LOCKED LOW VOLTAGE BUSHING
The bushing and terminal are key-locked to prevent turning when terminals are tightened. Eliminates loose terminal connections that could cause internal short circuits. Takes either copper or aluminum conductor.

Wagner maintains a nationwide organization to provide fast convenient service, with branches in 32 principal cities.

Bulletin TU-141 gives complete information on Wagner Distribution Transformers. Write for your file copy today.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

ELECTRIC MOTORS • TRANSFORMERS

DISTRIBUTION TRANSFORMERS

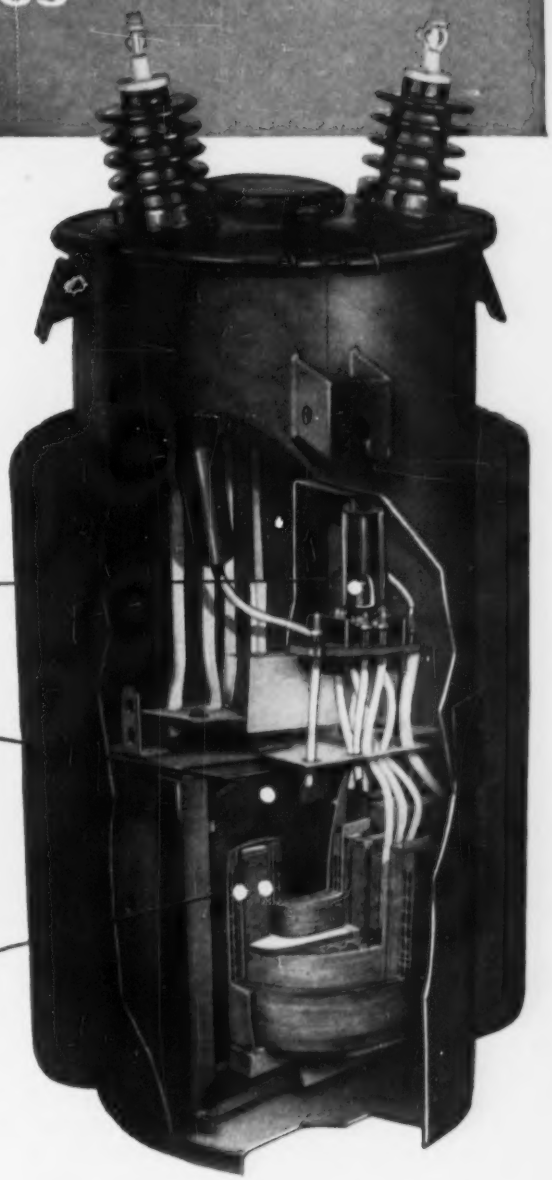
and electrical features

LONGER SERVICE LIFE!

Wagner Form W Distribution Transformers are exactly right for modern distribution systems. Their small size and light weight make them easy to handle—to store—to mount on poles.

Form W Transformers come in a complete range of single-phase ratings, 500 kva and smaller, 69 KV and below. All Form W Transformers, in ratings 3 through 167 kva, 15 KV and below, are designed for pole mounting.

You can choose either conventional or protected type Form W Transformers for your distribution lines with full confidence that they will pay dividends in longer service life.



ROTARY TAP CHANGER

Positive action . . . pre-loaded spring maintains constant pressure between the moving contact and the tap studs.

FORM W CONSTRUCTION

CORES are of cold rolled oriented grain transformer steel, cut into two turn sections, which are assembled through and around the coils.

COILS are wound of pure copper wire or strip, with high dielectric insulating material between layers in the high and low voltage windings. Insulation has crimped edges to hold windings accurately in place to permanently maintain electrical clearances.

BONDED INSULATION

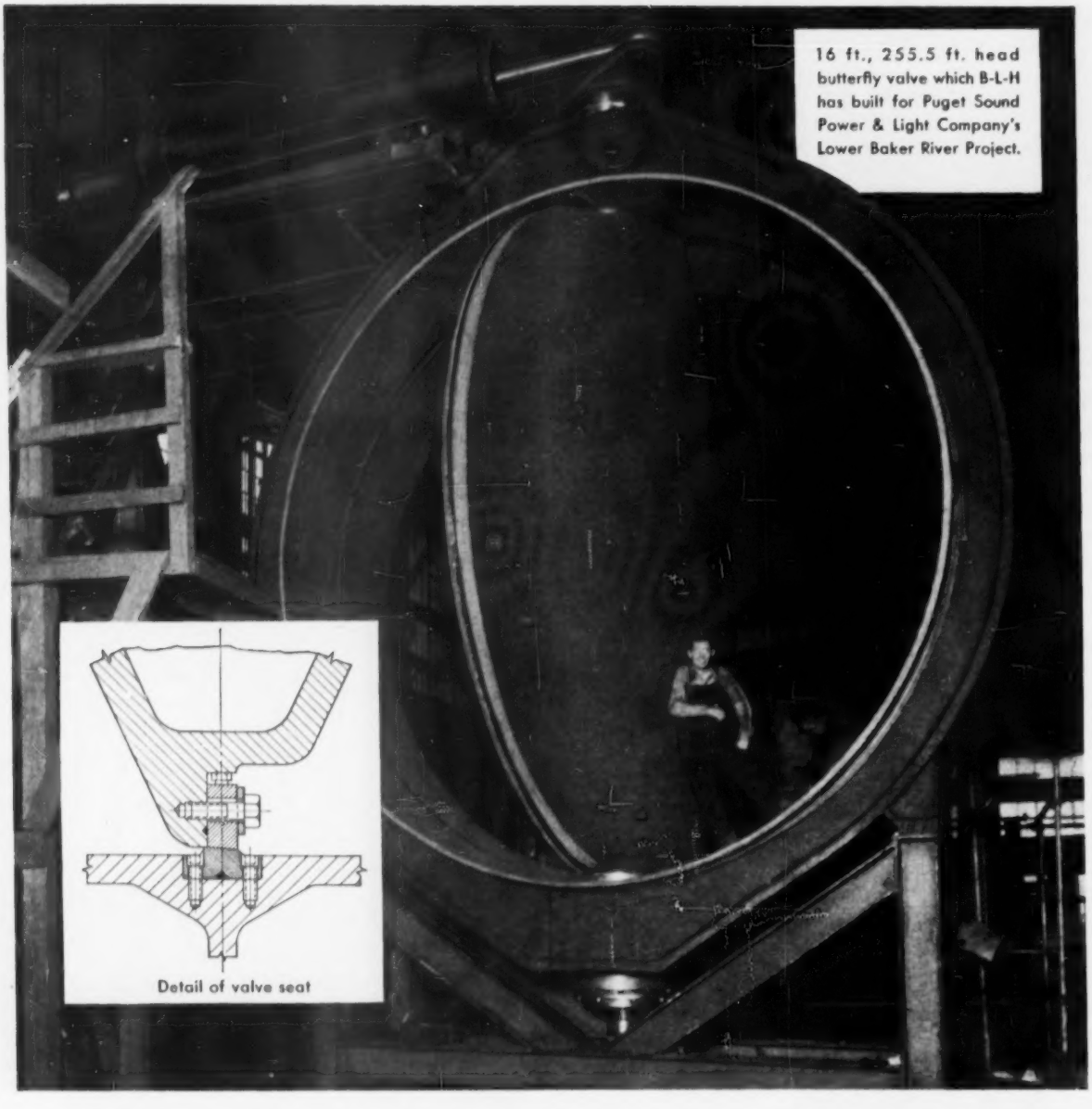
An improved thermo-setting material for layer, channel and barrier insulation is bonded to the coil conductors to give the coils great mechanical and electrical strength.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6381 Plymouth Ave., St. Louis 14, Mo., U. S. A.

157-3

INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC


16 ft., 255.5 ft. head butterfly valve which B-L-H has built for Puget Sound Power & Light Company's Lower Baker River Project.
Detail of valve seat

Adjustable seat designed by B-L-H for butterfly valve cuts leakage to minimum

Built for the Puget Sound Power & Light Company, this hydraulically operated B-L-H butterfly valve reduces leakage to a minimum by means of a specially designed valve seat that is simply and quickly adjusted. Since it is used to effect complete closure in emergencies caused by failure of the wicketgates to operate, as well as during scheduled shutdowns of the turbine, the need for a valve that will virtually eliminate leakage is vital.

Through its Eddystone and Pelton Divisions, B-L-H has built hundreds of butterfly valves of all sizes. In addition, B-L-H manufactures governors, pumps, surge suppressors, all four basic types of hydraulic turbines, and related equipment.

For illustrated bulletins, write to B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth Street, San Francisco 10, Calif.

BALDWIN · LIMA · HAMILTON

Eddystone Division

Philadelphia 42, Pa.

Hydraulic turbines • Weldments • Dump cars • Nonferrous castings • Special machinery • Bending rolls • Machine tools

A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SPECIAL SERIES

BASIC RESEARCH . . .
More Practical Than You Think

This editorial, one of a special series on the importance of research to the American economy, deals with an aspect of our research program that may have serious consequences in future years — the lag in basic research.

An earlier editorial in this series noted: "The keen interest of U. S. business firms in scientific research points the way to a new kind of prosperity for our economy — a prosperity based on deliberate creativeness." As a result of the dramatic increase in industry's research expenditures, more new products will be introduced in the years 1957-1960 than in any previous four-year period.

A steady stream of new products and new processes means better values for consumers and lower costs for business. And thus it promises to sustain a high level of general prosperity that defies the old laws of boom and bust. **But, as we look further ahead, there is a danger that the stream of research discoveries may run dry because of our neglect of basic research.**

This danger was described by John Jay Hopkins, late founder and chairman of the General Dynamics Corporation: "Unless there is a revolutionary development in America of pure, not applied, science, there will come a day when there is no use in trading in your old car; because the new one is no better. The only difference between this year's television set and next year's will be the appearance of the cabinet! Scientific progress will be replaced by scientific stagnation."

What Basic Research Is

Basic (or pure) research has been characterized as the pursuit of knowledge for its own sake rather than to fulfill some practical objective. It is generally carried out in an environment which allows the investigator the freedom to follow the lead of his curiosity. The scientist in basic research, in the words of Glenn T. Seaborg of the University of California, is not concerned with "utilitarian goals, but a search for deeper understanding of the universe and the living and inorganic phenomena within it."

Impractical as basic research may seem in its initial purpose, it is an essential prerequisite to applied research and product development. A few examples will show how some of the greatest technical advances of recent years have come from basic research projects that had no immediate practical objective:

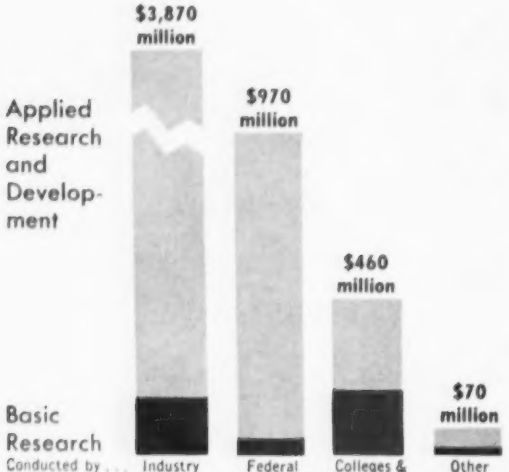
- **Radar** — an important military development of World War II with broadening commercial applications — was the outgrowth of a basic research project whose purpose was to obtain information about the height of the ionosphere, the layer of air that lies some 25 miles above the earth's surface.

- **Transistors** — the miniature devices which are already vital components of hearing aids, pocket radios and a wide variety of industrial equipment — were invented at Bell Laboratories (research subsidiary of the American Telegraph and Telephone Company) following university investigations into the electrical behavior of solids.

- **Neoprene** — a synthetic rubber — was developed by duPont with the help of basic information provided by Father Nieuwland of Notre Dame, who discovered he could control the polymerization (the linking together of molecules) of a certain class of organic compounds.

- **Nylon** — the first of the noncellulosic synthetic fibers that have revolutionized the textile industry — grew out of fundamental research by Dr. Wallace Carothers on long-chain polymers.

Only 8% of All Research and Development in the U. S. is Devoted to Basic Research



Data: National Science Foundation, "Funds for Basic Research in the United States, 1953"

Industry's Stake in Basic Research

Industry traditionally has relied upon colleges and universities and other nonprofit institutions for basic research; and the U. S. has long benefited from the greater emphasis placed on basic research in Europe. It is conventional to think that business cannot, and should not, do much about "ivory tower" projects which do not have immediate practical application.

However, there is not so much in this idea as is supposed. The examples above illustrate what Caryl Haskins, president of the Carnegie Institution, has called "the widespread paradox that the most important practical consequences are commonly the least sought after." Furthermore, it is certain that, without adequate basic research, industry's efforts to produce new and better products will become progressively more difficult. And our national defense, in an age of breathtaking military applications of science, will become increasingly precarious.

In the past, our economic growth came largely through expansion into new lands or through discovery and development of rich deposits of natural resources. Such opportunities are relatively limited today. The great opportunities now lie in discovering new materials and new properties of the materials we already have. **This is the job of basic research, and industry has a vital stake in it.**

The chart indicates the tiny share of research efforts in the U.S. that is devoted to basic research. **Only 4% of all research by industry, and only 8% of all research in the U.S., during the year 1953** (the latest for which information is available) **represented fundamental research to add to overall scientific knowledge.** Even in colleges and universities less than half the research performed is basic research. At least one Nobel Prize winner has expressed the belief that we need and should work toward a doubling of the proportion of our total research effort that is devoted to basic research as soon as possible.

What Business Can Do

Without anything like a staggering increase in the total cost of its research programs, industry could do much to expand our basic research effort. Companies with big research programs should, as a matter of successful survival, be devoting a share of the effort in their own laboratories to basic research. Significantly, companies that are already doing a notable job of basic research have also made an outstanding record of translating such research into new products for industry and the consumer.

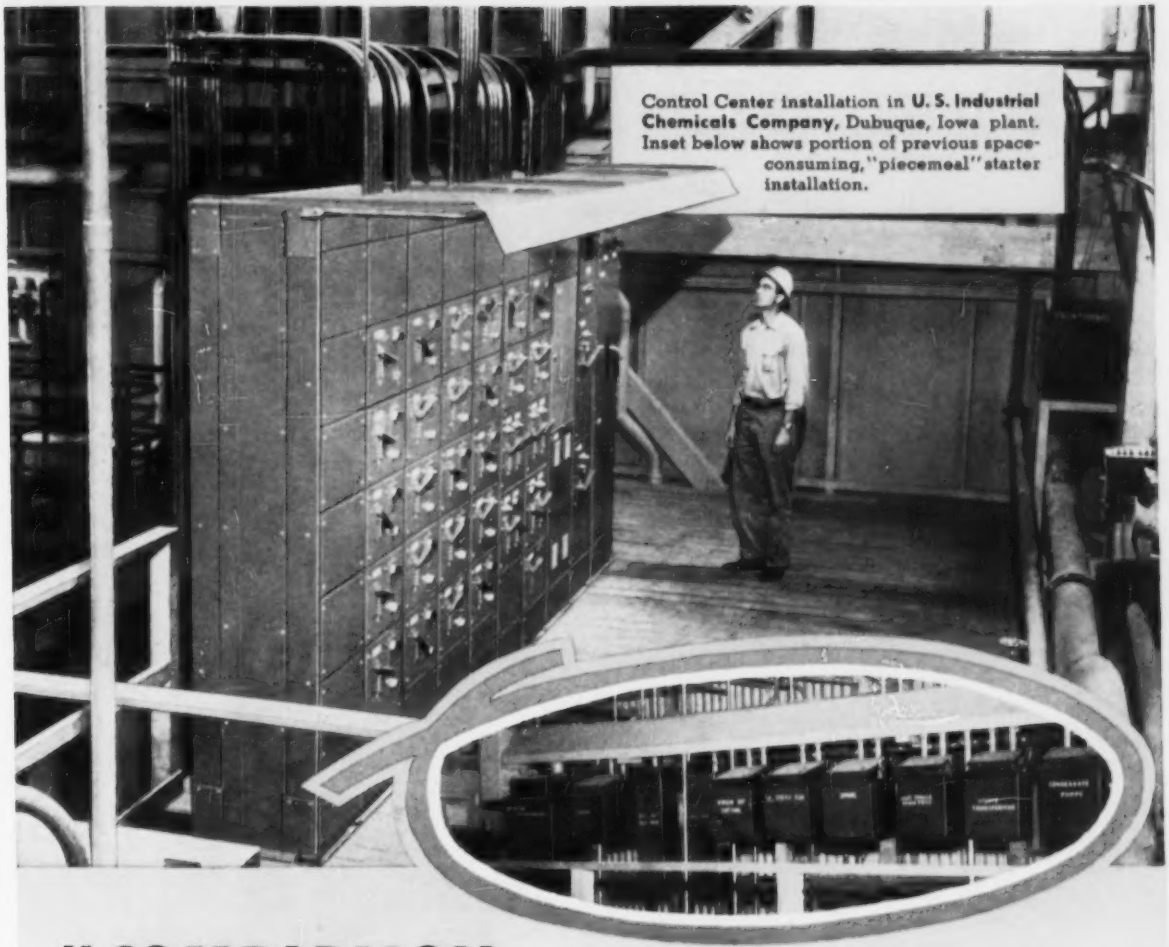
Smaller companies may rightly regard the conduct of research projects with uncertain prospects of reward as a luxury. Some basic research, indeed, never results in any tangible payoff. But, with modest contributions, small companies can still have a part in the advance of basic research. They can join together with other companies on cooperative projects. They can support basic research through trade associations and technical societies. They can help research centers in universities and other nonprofit institutions. Arrangements are available in some instances whereby business firms can pay a fee to have access to work done by university researchers.

One way or another, it is up to private business firms to see that basic research moves forward. By doing so they will be laying the groundwork for the development of the new products and technology on which their growth, and the growth of the economy, depend.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



Control Center installation in **U. S. Industrial Chemicals Company,** Dubuque, Iowa plant. Inset below shows portion of previous space-consuming, "piecemeal" starter installation.

"COMPARISON convinced us that a SQUARE D Control Center offered us MORE!"

These design features make Square D your logical choice, too...

INCREASED SAFETY because bus bars are fully enclosed, rigidly supported and have ample cross section. Circuits are isolated by individually enclosed plug-in units. Disconnect handle designed for maximum operator protection.

FLEXIBILITY. Individual plug-in units or complete sections are easily added, removed or exchanged. Pushbuttons, pilot lights, and selector switches are readily added to unit doors.

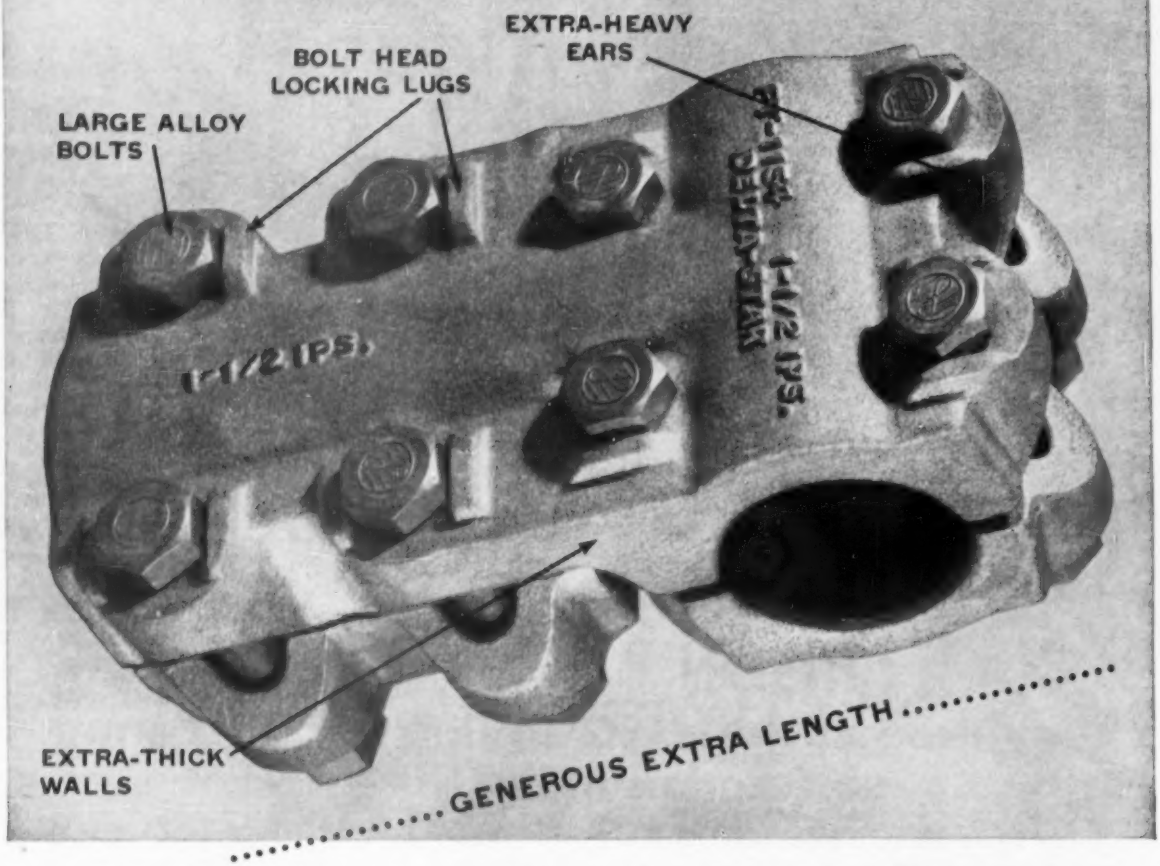
INSTALLATION ECONOMY. All wiring channels are large and accessible from front without removing units. No "wire fishing."

SPACE ECONOMY, TOO. Up to six combination starters fit in a 20" x 20" x 90" section. Plug-in unit heights designed in space-saving increments of 3 inches.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

New..Delta-Star Heavy Duty Aluminum Connectors!



Delta-Star announces a complete new line of connectors. Extra rugged construction and engineered for maximum service life under all conditions... Particularly important in this new line are the heavy walls and generous overall dimensions. With these features pressure is distributed to permit optimum contact yet with negligible cold flow...All sizes and ranges of conductors are cast on surface of each connector...Can be supplied in types and sizes to meet all connector requirements. For further information, write Delta-Star Electric Division, H. K. Porter Company, Inc.—2437 West Fulton Street, Chicago 12, Illinois.

District Offices in Principal Cities

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

THIS MONTH'S NEWS

Sea Water Conversion Studied by Utilities

Plans for a joint research and development project to investigate economical ways of converting sea water to fresh water were discussed in Los Angeles at a recent meeting of representatives of seven California power generating agencies and the U. S. Department of Interior.

The group considered various methods of using partly spent low-temperature steam from steam electric power generating stations for the distillation, including a process being developed by the Interior Department and W. L. Badger of Ann Arbor, Mich.

Ways and means of setting up a pilot test plant for saline water conversion research, possibly at Southern California Edison's Mandalay steam station near Oxnard, will be considered at a second meeting of the group to be held in the near future.

Electric utilities invited to the meeting included California Electric Power Co., Pacific Gas and Electric Co., San Diego Gas & Electric Co., Los Angeles Department of Water & Power, Pasadena Municipal Light & Power Dept., and the public service departments of Glendale and Burbank.

Rate Increase Granted After PG and E Request

Pacific Gas and Electric Co. has won a 5.16% rate increase expected to add $16,967,000 a year to revenues. The California state public utilities commisison estimates the hike will give the company a 5.75% rate of return.

The rate increase, effective Nov. 15, applies to all customers.

The PUC denied PG and E's request for an escalator clause that would allow electric rates to fluctuate with the cost of fuel for steam plants (which generate two-thirds of the company's power.) The commission said such clauses may have a place where competitive conditions have to be met, but that's not the case here.

A major question—whether the company can use accelerated depreciation—was left unanswered. The commission said that pending a decision on this issue PG and E should report actual tax expenses. The company has been taking fast depreciation and reporting normalized taxes. The PUC now will allow normalized taxes only on accelerated amortization.

The rate increase granted is based on straight-line depreciation, and it will have to be changed if PG and E elects to take accelerated depreciation, the commission said.

The order also put a stop to agricultural conjunctive billing.

Fresno Contesting Edison Hydro Job

Southern California Edison Co. has run into an unexpected snag in its plans to build a $49,600,000 dam and hydroelectric generating plant on the Upper San Joaquin River.

The city of Fresno filed official protest against the project at a California Public Utilities Commission certification hearing Oct. 22. City officials argued that the development might interfere with Fresno's projected program to obtain additional water from the river.

They pointed out that the Edison plant, which would be located 60 miles northeast of Fresno, would impede the flow of water by reason of the dam and hence tend to weaken the city's position in obtaining water rights.

Heco Electric Station Gets President's Name

The new Honolulu power plant of Hawaiian Electric Co., which was recently completed with the installation of a second generating unit, has been given the name of Leslie A. Hicks, president of the company for the past 20 years.

Under Hicks' presidency, Heco's investment in facilities has grown from $14,000,000 to more than $76,000,000, and capability of the system from 60,000 kw to 335,000 kw. Total capacity of the Leslie A. Hicks power plant is 110,000 kw.

An announcement of the honor bestowed on Hicks reports that 64% of the company's generating plant is less than 10 years old.

Franklin County PUD Has Tenth Anniversary

Capacity of the Franklin County Public Utility District electric system has been increased 360% during the PUD's first 10 years of operation to keep pace with the expanding power needs of one of Washington State's fastest growing areas, manager Harry H. Hudlow states in a 10th anniversary report.

"The PUD began operation in Franklin County on November 8, 1947, serving 3200 customers in the Pasco, Connell and Kahlotus areas," Hudlow said. "The steady influx of new people and the development of new farms, businesses and industries in Franklin County during the past 10 years have more than doubled the number of customers served by the PUD, raising the total to an average of 6,800 this year.

Colorado Central Wins Court Case With Denver

Denver city government lost a court fight to block construction of a power line along property reserved by the city for construction of an airport.

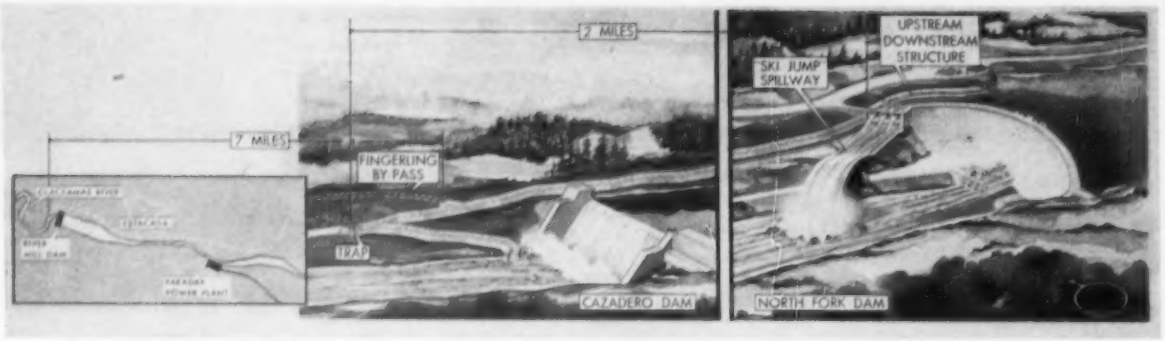
Colorado Central Power Co. is erecting the line along the south border of a 720-acre plot known as the Arapahoe County Airport.

Colorado Central is building the line to serve an electronics plant under construction by Ramo-Wooldridge Corp., and nearby residential areas.

Denying Denver's application for an injunction, District Judge Martin P. Miller said Colorado law empowers utility companies to install lines along public highways. He said Denver may have some recourse for damages but cannot prevent construction of the line.

Denver argued that construction of the line destroys use of the tract as an airport.

• **Arizona Public Service** Co. has received awards of commendation for its assistance in employment of the physically handicapped. The awards were in recognition of the fact that more than 25% of Public Service's employees are physically handicapped.



THIS ARTIST'S CONCEPTION shows the extensive fish facilities Portland General Electric Co. has under construction at a cost of $3,100,000 in conjunction with hydroelectric expansion projects on the Clackamas River. The plan includes a fish ladder nearly two miles long—the world's second longest—and a five-mile-long bypass for downstream migrants. The bypass, a first of its kind, will be built of transite pipe 20 in. in diameter and protect fingerlings from damage in present generation turbines at Faraday and River Mill plants. Ladder will extend from North Fork Dam, now under construction, some three miles east of Estacada, to the present Cazadero Dam. Completion is due next year

Tacoma Ends Contract On Mayfield Project

Payment of a final $2,196,052 settlement to the contractor will bring expenditures on the dormant Mayfield hydroelectric project of Tacoma City Light to more than $9,000,000.

The Tacoma Utility Board has approved termination of the $10,863,140 Mayfield Dam contract awarded in a 1955 financial settlement with the Arundel-Dixon Corp., the contractor.

The city was forced to terminate the contract because of failure to reverse a court decision holding that the city could not condemn a state fish hatchery which would be flooded by the dam. Work on the dam was about 40% completed when the state supreme court ruled last March that construction must come to a complete halt.

Wyoming Cities to Fight Ruling on Tax Payments

A Wyoming Board of Equalization ruling that municipally owned electric utilities may be assessed and taxed will be appealed to district courts by some, if not all, 13 communities involved.

Don Sherard, Wheatland city attorney and state legislator, said he was perfecting appeals for filing by Nov. 20. Sherard said Wheatland and Torrington definitely would appeal, but he has not heard from the 11 other affected communities.

The board ruled that municipally owned electric plants should be taxed the same as private utilities and denied the towns' contention that the electric plants were being operated as a "governmental function."

Wyoming voters last November passed a constitutional amendment subjecting all city, county, state and federal property to ad valorem taxation. The 1957 legislature then exempted certain specific governmental property from taxation and allowed the state board of equalization to exempt from taxation other property used for "governmental purposes."

Get Off the Worry-Go-Round

The Wheels Go 'Round

A real "wheel" in action. If he doesn't calm down, he'll explode one of these days.

Of course you'll see few men with four phones on their desks. We exaggerated this one a bit to emphasize how foolish this man is. Pretty soon he'll be where he can't phone any more.

If you doubt that this way of living is disastrous, just read obituary notices for a few days. You'll be shocked to learn how many young men die from sudden heart attacks. Doesn't make much sense, does it?

Fluor Corp. To Build Calectric's Station

Plans for construction of the $25,000,000 Cool Water steam electric generating plant on the Mojave Desert by California Electric Power Co. advanced when the utility announced selection of the Fluor Corp., Ltd. to design and construct the facility.

Initial plans call for construction of two 60,000-kw units at the plant site which is located near Daggett on the Mojave River. The first unit is scheduled to be in operation by June 1960, with the second unit presently planned to be placed in operation one year later.

Cool Water plant will be the fourth steam electric generating facility to be constructed by Calectric in the past 10 years.

• An appropriation of $80,000 for start of modernization of street lights on San Francisco's downtown Market St. has been approved by the Board of Supervisors. Funds will be used to replace incandescent lights with either mercury vapor or fluorescent luminaires on the "Path of Gold" for a distance of three or four blocks. The present ornamental blue and gold standards will be retained.

• **Jas. E. McCaffrey,** general manager and chief engineer for Sacramento Municipal Utility District announced today a bronze "Oscar-of-Industry" has been awarded SMUD's 1956 annual report by the weekly magazine *Financial World.* Word of the award was received in a telegram to Royal Miller, president of the district's board of directors.

The Fifty Largest Utilities as listed in the 1957 FORTUNE DIRECTORY

★ American Tel. & Tel. (New York)
★ Pacific Gas & Electric (San Francisco)
★ Consolidated Edison of New York
★ Commonwealth Edison (Chicago)
★ American Gas & Electric (New York)
★ Tennessee Gas Transmission (Houston)
★ Public Service Elec. & Gas (Newark, N. J.)
★ Southern California Edison (Los Angeles)
★ Southern Co. (New York)
★ Detroit Edison (Detroit)
★ Philadelphia Electric (Philadelphia)
★ Niagara Mohawk Power (Syracuse, N. Y.)
★ General Telephone (New York)
★ El Paso Natural Gas (El Paso, Texas)
★ Columbia Gas System (New York)
★ General Public Utilities (New York)
★ Consumers Power (Jackson, Mich.)
★ American & Foreign Power (New York)
★ American Natural Gas (New York)
★ United Gas (Shreveport, La.)
★ Texas Utilities (Dallas)
★ Middle South Utilities (New York)
★ Pacific Lighting (San Francisco)
★ Texas Eastern Transm. (Shreveport, La.)
★ Consolidated Natural Gas (New York)
★ Central & South West (Wilmington, Del.)
★ New England Electric System (Boston)
★ Pennsylvania Power & Light (Allentown)
★ Union Electric (St. Louis)
★ Ohio Edison (Akron)
★ Virginia Electric & Power (Richmond)
★ Peoples Gas Light & Coke (Chicago)
★ Northern States Power (Minneapolis)
★ Cleveland Electric Illum. (Cleveland)
★ West Penn Electric (New York)
★ Duke Power (Charlotte, N. C.)
★ Long Island Lighting (Mineola, N. Y.)
★ Baltimore Gas & Electric (Baltimore)
★ Duquesne Light (Pittsburgh)
★ Northern Natural Gas (Omaha, Neb.)
★ Wisconsin Electric Power (Milwaukee)
★ Transcontinental Gas Pipe Line (Houston)
★ Panhandle Eastern Pipe Line (New York)
★ Public Service of Indiana (Plainfield)
★ Florida Power & Light (Miami)
★ Illinois Power (Decatur, Ill.)
★ Western Union Telegraph (New York)
★ Boston Edison (Boston)
★ New York State Electric & Gas (Ithaca)
★ Cincinnati Gas & Electric (Cincinnati)

© 1957 Time Inc.

Among the 50 largest utilities, only <u>one</u> electric or telephone utility is a Preformed prospect...

the rest are Preformed customers

In July, 1947, Preformed Line Products Company didn't have a customer; all the electric and telephone utilities were prospects. Today, the situation is almost completely reversed.

For example, in FORTUNE's list of the "Fifty Largest" utilities, only one of the *electric* and *telephone* utilities mentioned is still a prospect; all the rest are now Preformed customers. In other words, the Preformed principle of using preformed helical rods for line accessories has gained almost complete acceptance in only 10 years.

If you are among the few utilities not utilizing Preformed, you might ask "Why?". PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland ...in 10 years the leading manufacturer or armor rods, dead-ends, Guy-Grip dead-ends, splices and other line accessories.

PLP

You can <u>look up</u> to **Preformed**

IF IT CARRIES CURRENT, KW CARRIES IT!

NEW LAYTEX-RESIN INSULATION GIVES KW CONTROL CABLES FINEST PROTECTION MADE!

Now with new "Kaiser Master" Control Cables, KW brings you *Laytex®Resin*... most significant advance in control cable insulation since the introduction of Laytex insulation in 1932.

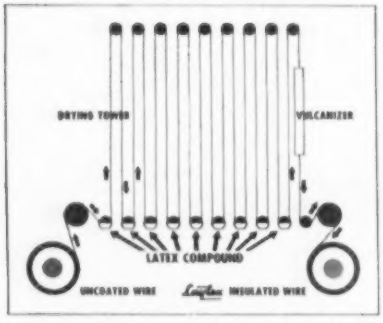
In Laytex-Resin, the synthetic resin conductor covering becomes an integral part of the insulation. The resin is applied in the same dip process as the Laytex, and is fused right into the rubber. This eliminates the need for protective braid covers, which in turn permits greatly reduced cable diameters!

In addition to smaller diameter and resulting lighter weight, Laytex-Resin cables offer all these other advantages over cables with braided conductors:

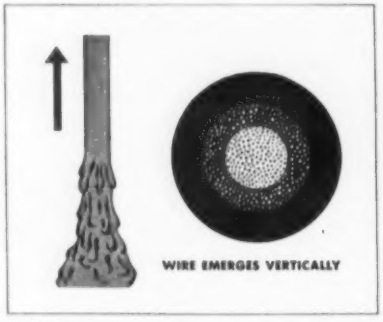
1. **More complete (100 per cent coverage) protection of the insulation.**
2. **Greater protection of the insulation against acids, alkalies, flame, fungus, moisture, oil, ozone and light checking.**
3. **Cover does not fray or wick moisture.**
4. **Splicing and taping made easier.**
5. **Smoother conductor surface.**
6. **More attractive colors (including stripes).**

For a record of dependability in municipalities all over America, KW Laytex-Resin Control Cables are backed up by twenty-five years of perfect service given by their predecessors, Laytex insulated control cables.

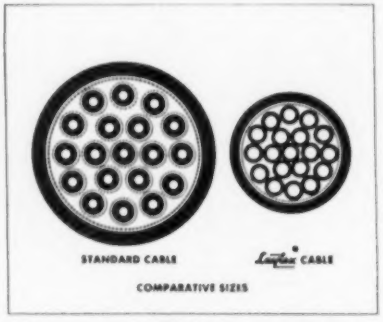
KW "Kaiser Master" Control Cables more than meet the standards set up by I.M.S.A. Specifications No. 16. These cables have tinned or alloy-coated solid copper conductors in accordance with A.S.T.M. requirements. The choice of an overall protective covering for these cables is determined by the customer and is governed by conditions of installation and use.



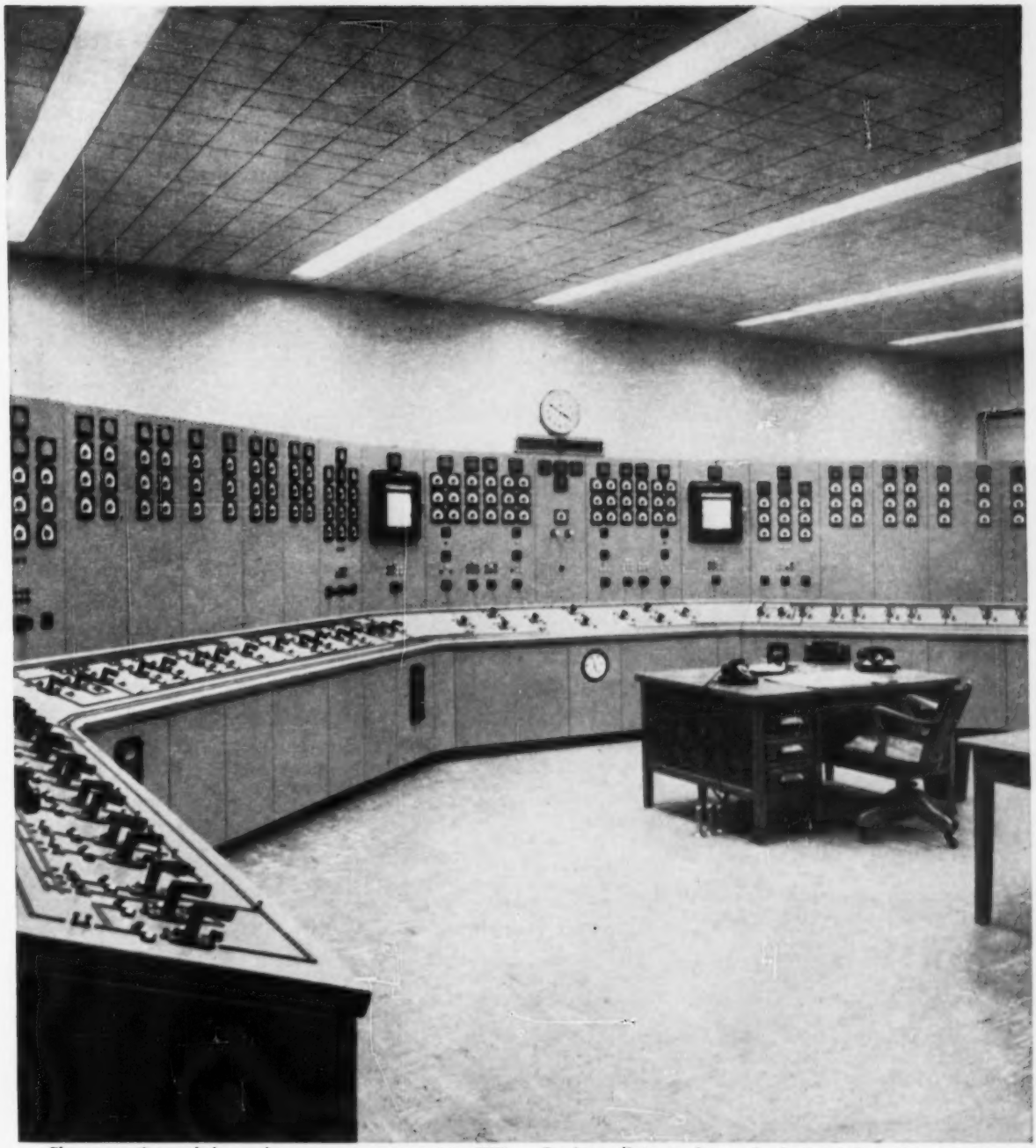
Laytex-Resin is applied to each individual conductor by the dip process diagrammed above. Because the rubber is applied in unmilled form and the resin is bonded directly to it, Laytex-Resin insulation has no "grain"—its physical properties are *uniform in all directions.*



In the dip process, the conductor emerges vertically from the liquid compound, forming the compound in uniform layers around the conductor. This results in a perfectly centered conductor and permits an insulation with thinner walls than are possible with extruded rubber.



Because the wall thickness required with Laytex-Resin is only one-third to one-half that required for conventional insulations, and because braided conductor covers are eliminated entirely, Laytex-Resin makes possible *more wires per conduit* . . . plus reduced weight and increased flexibility.



The properties and the performance demonstrated by KW Laytex and Laytex-Resin Control Cables all add up to unequaled *Dependability*. These cables may be installed (1) in conduits, ducts or trays, (2) as aerial cable on a suitable messenger, or (3) buried in the ground.

For immediate service, or for further information and samples, call the Kaiser Aluminum sales office or the KW distributor listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, Calif.; *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.

KAISER ALUMINUM

THE BRIGHT STAR OF METALS

SEE "MAVERICK" • SUNDAY EVENINGS, ABC-TV NETWORK • CONSULT YOUR LOCAL TV LISTING

Open House Held At Encina Plant

San Diego Gas & Electric Co. held a "Stockholders Day" on Oct. 19 at their Encina power plant in Carlsbad, Calif., where two of the new 106,000-kw units are operating and a third is under construction.

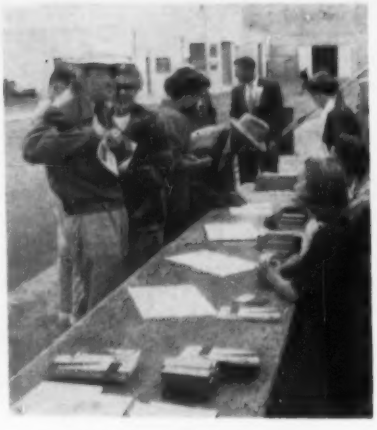
Close to 900 guests attended and were shown many facets of power plant operation. The occasion also afforded stockholders an opportunity to make the acquaintance of the people who manage and operate the company.

Two tents were set up to serve as reception centers. After the guests registered, they were greeted inside the tents by Company President E. D. Sherwin, who gave welcome talks at intervals throughout the day. The guests were then divided into groups of from 10 to 15 and taken on guided tours of the plant. Operation of the plant and equipment was explained along the way by specialists.

Guests were greeted between 9:30 and 11:30 a.m. and 1:30 and 3:30 p.m., being allowed to come at their convenience. Individual visits averaged longer than an hour. Refreshments were served at the end of the "trip."

This first showing of the new plant to stockholders was planned after stockholders had been queried through the mail as to their interest in the project and their preference of dates. Over 2,000 responded enthusiastically to the plan, but cold weather kept many of the expected guests away.

Many stockholders took time out to express their gratitude to President Sherwin both at the event and later in letters for being invited to "Stockholders Day."



Private Company Gets Contested Franchise

The city council of Thornton, Denver suburb, voted unanimously to grant a 20-year franchise to Public Service Co. of Colorado to furnish electric and natural gas service.

The action climaxed a lengthy dispute whether PSC or Union Rural Electrification Assn. of Brighton would serve the community of more than 10,000 residents.

PSC agreed to return annually to Thornton 3% of gross revenue from electric service and 2% of gross revenue from gas service.

The action is retroactive to May 26, 1956, the date of Thornton's incorporation.

This canceled the suburb's street lighting debt, gives residents free electric service from May 26, 1956 until Nov. 16, the effective date of the ordinance granting the franchise, and puts an estimated $11,000 in retroactive franchise refunds into the treasury.

Paradise Dam Project Draws Some Opposition

The proposed Paradise Dam, a $450,000,000 project that would be built on the Clark Fork River about 70 miles northwest of Missoula, Mont., drew both praise and criticism from witnesses testifying at a hearing conducted by the Corps of Engineers at Missoula late in October.

The hearing was opened by Brig. Gen. Lewis B. Foote, North Pacific division engineer, and presided over by Col. R. J. B. Page, Seattle district engineer. About 200 witnesses were heard.

Two officials of the Northern Pacific Railway and a vice-president of Montana Power Co. expressed vigorous opposition to the project at the hearing. Carl H. Burgess, NP vice-president in charge of operations, and M. L. Countryman, NP general counsel, contended that Paradise Dam would result in irreparable damage to the railroad's transcontinental lines.

"It would not be possible to relocate NP lines in the reservoir area, so as to give as economical, safe or dependable line as the railroad now has," the NP officials said.

A. M. Chase, vice-president of Montana Power, said his company has plans to build two "tax-paying" dams at the Buffalo Rapids sites on the Flathead River if the Paradise project is not constructed.

Arnold Olsen, former Montana attorney general, said that Paradise Dam would provide 1,000,000 kw of power and would be of greater advantage to Montana than Hungry Horse Dam.

Wanapum Dam Location Announced by Grant PUD

The Grant County PUD has selected a site for construction of Wanapum Dam on the Columbia River but admits doubt as to whether construction can begin next year, as originally proposed.

Wanapum has been scheduled to follow 630,000-kw Priest Rapids Dam, now under construction by Merritt-Chapman & Scott under a $92,000,000 contract. The site now selected is 16 miles upstream from Priest Rapids, a few miles below a site previously considered.

Start of construction on Wanapum will be determined by the interest rates at which bonds can be sold and on the need for power in the Pacific Northwest, said Glenn Smothers, PUD manager.

An 8-tier run of Soapstone OCT-O-DUCT provides a new telephone link down hard-rock Nob Hill to colorful Chinatown in San Francisco.

YOU CAN ACTUALLY SEE SOAPSTONE DUCT SAVE YOU MONEY

1 Trenchside delivery of Soapstone OCT-O-DUCT eliminates field inventory problems and makes certain your duct is at your job when you need it.

3 OCT-O-DUCT's exclusive, flat-sided design eliminates the need for expensive interlayer spacers. Duct will not roll.

2 OCT-O-DUCT's convenient 4-foot lengths can be quickly installed by 2-men crews even in narrow and deep trenches.

4 OCT-O-DUCT is connected in the trench with easy-to-apply circular couplings making possible fast, rhythmic, production-line installation.

The many time- and work-saving features of Soapstone OCT-O-DUCT and full information on the sizes, bends and accessories available from this 30-year-old Company are contained in our Catalog and Installation Manual. For your FREE copies, drop us a note on your letterhead.

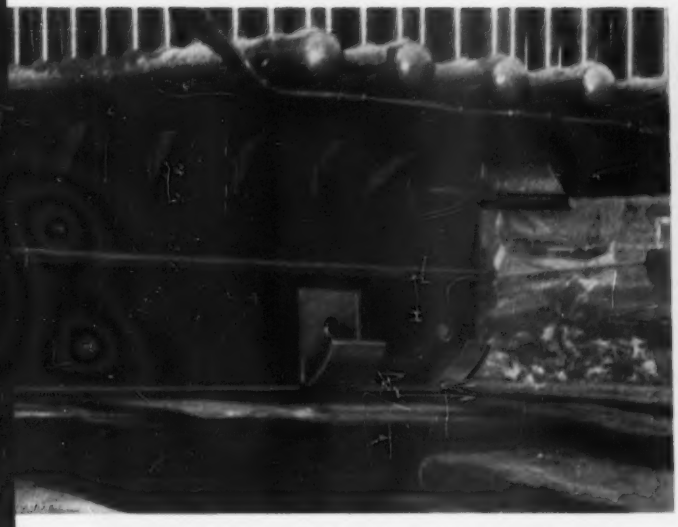
SOAPSTONE DUCT COMPANY

3985 Beach Street, Oakland 8, California

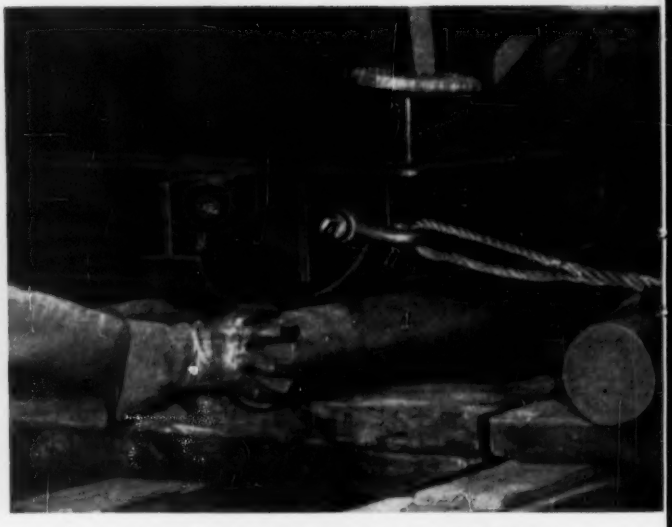
Distributed in the West by

MAYDWELL & HARTZELL, INC.

SAN FRANCISCO, LOS ANGELES, SAN DIEGO, PHOENIX, PORTLAND, SEATTLE, SPOKANE



The 4-way sled-runner base facilitates positioning this Westinghouse standardized substation transformer for unloading at Detroit Edison Co., Carpenter Substation.



The 4-way sled-runner base carries the transformer smoothly and easily to the installation point without bumping or biting into the wooden rollers.

THE DETROIT EDISON COMPANY REPORTS . . .

Easier, safer moving and installation of Westinghouse standardized substation transformers with sled-runner bases

"Handling this 5,000-kva Westinghouse substation transformer during unloading and installation was greatly simplified by its four-way sled-runner base," according to a recent statement from The Detroit Edison Company.

"The eyeholes for attaching towing cables with a standard clevis cut time and trouble from the handling. The four-way runners had a special advantage when the transformer had to be turned . . . additional cables could be attached and the unit slewed around in a smaller space."

Another advantage noted was the elimination of digging into the wooden rollers because of the cast-steel shoes welded to the I-beam base and wider flanged base construction which affords generous bearing surfaces.

This base provides rigid support for the bottom of the transformer tank, protecting it during movement of the unit. It also protects valves and other projections against damage from accidental blows.

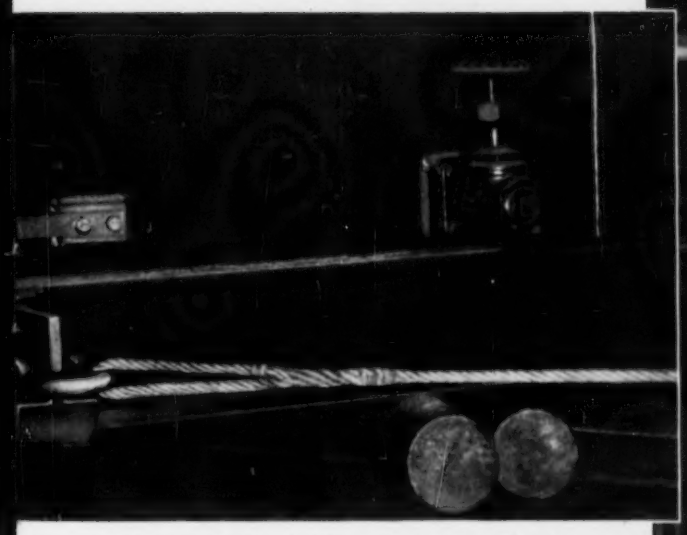
Stability is provided by this base, too. It is so constructed that the safe angle of tilt is at least 15° from the horizontal.

Jacking facilities are provided at the corners of the tank, in accordance with ASA standard requirements.

All Westinghouse standardized substation transformers are equipped with four-way sled-runner base.

J-70832

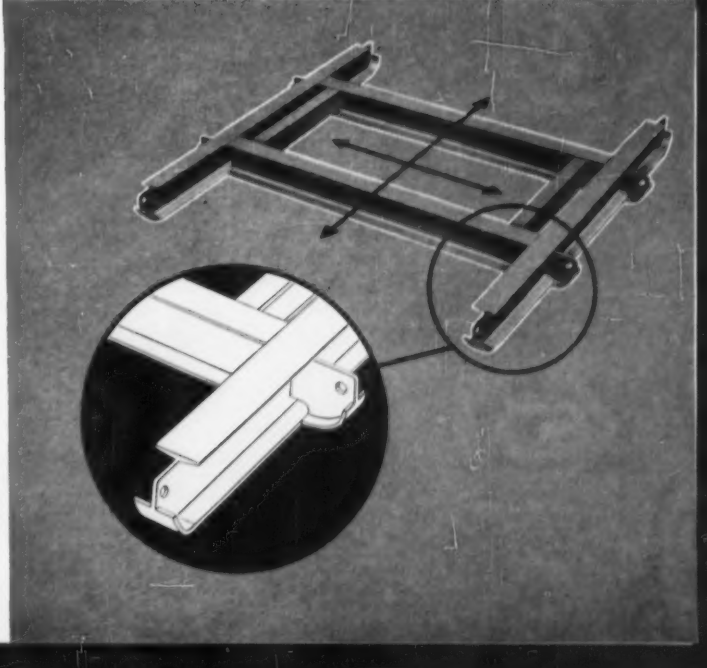
YOU CAN BE SURE.. IF IT'S



Cables can be inserted for pulling or restraining in any of the eight eyeholes in the 4-way sled-runner base. This facilitates accurate positioning of the transformer.

This 5000-kva Westinghouse standardized substation transformer is being moved into installation position. This is a 3-phase, Class OA, Type SL transformer with a rating of 24,000/41,570 wye, 4800 volts.

The 4-way sled-runner base permits this 22-ton transformer to be moved forward, backward or to either side.



Westinghouse

Reach For
Test-Proven

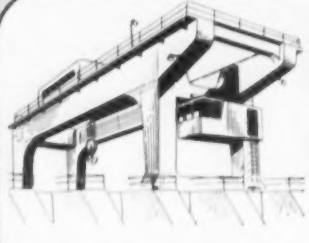
ACCURATE TAPE

FRICTION .... RUBBER .... PLASTIC

Test-proven by International Testing Laboratories, Inc., for bond and tensile strength, climatic extremes, dielectric qualities, and elongation tests. Accurate exceeded all ASTM requirements. Rely on Accurate with confidence—Accurate is the choice of electrical men everywhere. Accurate Plastic Tape is Underwriters' Laboratories approved.

Send today for our most recent bulletin describing details.

ACCURATE MANUFACTURING CO.
GARFIELD, NEW JERSEY



GANTRY FRAMES

FOR HYDRO DEVELOPMENTS

It takes know-how and experience to fabricate gantry frames and other steel components for western hydro developments. For information that will show you we have both, write:

GATE CITY STEEL

Box 1487 Boise, Idaho

Executive Offices: Denver, Colorado

Fabricating Plants: Boise, Idaho and Omaha, Nebraska

NEWS ABOUT PEOPLE

Puget Power Personnel Appointments Announced

Five important organization changes were announced recently by the Puget Sound Power & Light Co. The new appointments became effective Nov. 1.

Richard P. Mortell will become the company's assistant operating manager. Currently he is superintendent of the division of power supply in charge of all the company's generating facilities.

Emmet P. Kelly will succeed Mortell as superintendent of the division of power supply. Kelly, who has been with Puget since 1929, is now superintendent of transmission.

A newcomer to the Bellevue area will be Francis H. Ferguson, who transfers to the general engineering department. Presently superintendent of the central division in Renton, Ferguson has been with the company since 1923 when he was hired as a meter tester.

Succeeding Ferguson will be Howard G. Carter, who joined Puget in 1936 as an office clerk, became superintendent of light and power for the western division in 1947 and is currently assistant to the executive vice-president. Eugene L. Bush, an engineer in the system operations department, will succeed Carter. Bush joined Puget in 1941.

• **Albert Streiff** retired Oct. 31 as an engineer in Portland General Electric's distribution department. He first worked for PGE in 1912 as a clerk, a job he left to attend Oregon State College, where he was graduated with a BS degree in electrical engineering in 1917.

• **James K. Richardson,** chief of the mechanical branch of the Bureau of Reclamation's engineering offices at Denver, retired Nov. 30, completing more than 25 years of government service. He has served continuously with the bureau since 1933.

• **B. E. Lowe,** formerly sales manager of the Trans-Canada Pipe Lines Ltd., Toronto, has been appointed assistant to the president of Sierra Pacific Power Co. Lowe is a native of Colorado Springs, a graduate electrical engineer, and has been in the utility business with Southwestern Light & Power Co. in Oklahoma and Trans-Canada.

beautiful from the OUTSIDE...

...even *Greater Beauty* when you step inside!

The beauty of a Benjamin Panel-Glo lighting system cannot be confined. It comes right through to the outside! It supplements today's slickest store fronts to attract even more traffic and beckon even more potential customers to "come on in." On the inside, Panel-Glo's gently-diffused, shadow-free, high-level lighting stimulates a greater desire to buy. Gone is the forest of lighting fixtures, ugly ducts, pipes, beams and other ceiling irregularities. Panel-Glo conceals them all, to create a magnificent ceiling of light . . . at lower-than-ever cost! Send for Panel-Glo Facts Bulletin. Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Ill.

PANEL-GLO TRANSLUCENT LIGHTING SYSTEMS

BENJAMIN

...always the source of good lighting

Now Setting the Pace in COMMERCIAL LIGHTING

CALIFORNIA
San Francisco Office:
829 Folsom Street; DOuglas 2-6246
O. C. Westberg, Western Division Manager
D. D. Moore
H. F. Christensen
Los Angeles Office:
923 East Third Street;
MAdison 6-6076
R. S. Bergman
J. Kersbergen

OREGON
4725 S.W. 18th Place; CHerry 4-7214, Portland
F. A. Farley

UTAH
318 Dooly Building; ELgin 5-2322, Salt Lake City
L. M. Slusser

WASHINGTON
P.O. Box 3131; Main 0350, Seattle
H. R. Huber

6182-EW

DEPENDABLE OUTDOOR LIGHTING CONTROL

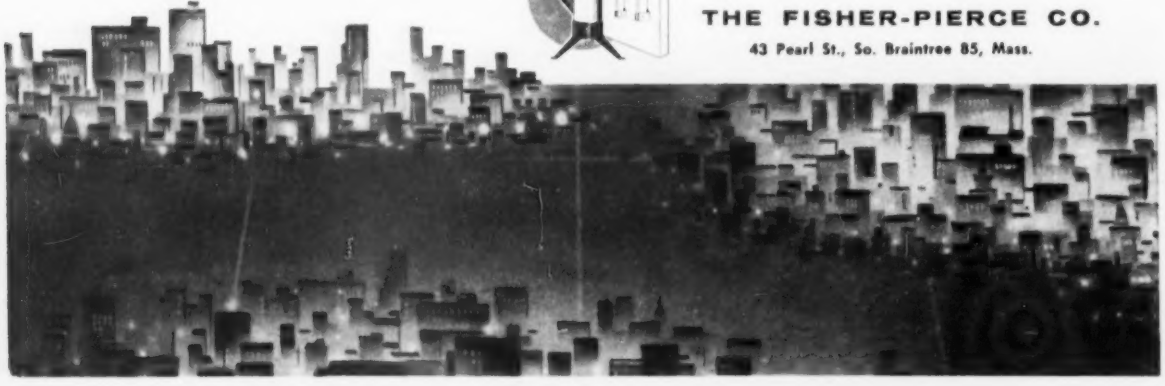
.....from coast to coast

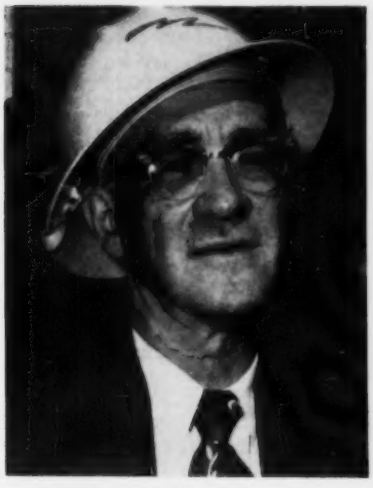
Throughout the United States, Fisher-Pierce units have provided more hours of dependable street light control than any other make of photoelectric control. For more than twelve years Fisher-Pierce has set the pace in the development and manufacture of photoelectric controls for all types of outdoor lighting.

Today Fisher-Pierce, backed by an organization of 600 people, offers unlimited facilities for the development of new controls and allied products for the electric utility industry . . . as well as the extensive service organization that stands behind each F-P control. Whether your requirements call for proven lighting controls for any type of outdoor lighting, development of new electric or electronic products, or engineering service in the installation and maintenance of lighting control systems . . . call on Fisher-Pierce.

THE FISHER-PIERCE CO.

43 Pearl St., So. Braintree 85, Mass.





Gruber

• **Albert Gruber** has been named technical research analyst for Washington Water Power Co. The new position is at the head of an expanded industrial development activity throughout the eastern Washington and northern Idaho service area. Gruber has been manager of the Lewiston division. His first project is the compiling of an up-to-date inventory on industrial resources and manufacturing facilities in the area.

• **Carl Miller,** manager of the Clallam County PUD at Port Angeles, Wash., for the past six years, has resigned. **William A. Fell,** PUD engineer, is acting as manager until a permanent appointment can be made.

• **Howard Helmers,** general manager of the Graham County Electric Co-op, was named president of the Grand Canyon State Electric Co-op Inc. at a meeting at Willcox, Ariz. Helmers, serving his ninth term as secretary-treasurer of the state-wide association, fills the unexpired term of the late **William H. Grove** until the regular election in January. **W. B. Lowing,** manager of the Sulphur Springs Valley Electric Co-op, replaces Helmers as secretary-treasurer.

• **Paul P. Ashworth,** executive vice-president and a director of Telluride Power Co., retired Nov. 1. He has been with the company since 1906 when he became a student operator and member of Telluride Institute. After completing his operating training, he rounded off his engineering education at Telluride House at Cornell University, earning degrees in both electrical and mechanical engineering.

• **Kenneth W. Worall** has been named Wyoming division office manager of Pacific Power & Light Co. He was formerly treasurer of Western Public Service Co., and later PP&L's office manager in Laramie. He has been in the electric utility industry since 1937.

• **Gerald J. Dermody,** overhead system general supervisor for Seattle City Light, retired Nov. 1 after nearly 35 years' service with the utility.

Newcomb

• **Aaron E. Newcomb** has been appointed as the first superintendent of the Dave Johnston steam-electric power generating plant under construction by Pacific Power & Light near Glenrock, Wyo. He formerly was power plant superintendent for the White Pine Copper Co. in White Pine, Mich. He served nearly 25 years with the Detroit-Edison Co. in Detroit before going to White Pine in 1953. He studied steam and electrical engineering at the University of Michigan and Michigan State College, and has been a national director of the National Association of Power Engineers Inc.

• **R. J. Pangborn** has resigned as chief engineer for Cowlitz County PUD at Longview, Wash., to become chief electrical engineer for the Arabian operations of the Arabian-American Oil Co. in Saudi Arabia. He joined the utility in 1946, had been chief engineer since 1950. **Donald E. Hughes** has been named acting chief engineer for the PUD to succeed Pangborn.

• **Fred Salfisberg** has been promoted to supervisor of electric distribution operations for Cheyenne Light Fuel and Power Co. He formerly was executive foreman of the electric meter shop. **John Lichtenwalter** was named supervisor of electrical distribution engineering for the company.

• **James D. Laughlin** has retired after 37 years of service with the Los Angeles Department of Water & Power. Beginning as an electrical tester, Laughlin rose to the position of assistant chief electrical engineer. Succeeding him will be **Arthur L. Williams,** formerly engineer of design and construction.

• **Norman A. Stoll,** chief counsel of the Bonneville Power Administration from 1948 to 1954, has joined the legal staff of Oregon Public Utilities Commissioner Howard Morgan with an assignment to prepare a redraft of Oregon's public utility laws for presentation to the 1959 legislature.

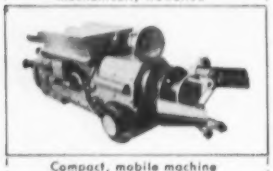
• **Otto F. Miller,** general supervisory construction inspector with the Portland District, Corps of Engineers, has retired after more than 21 years of federal service.

Fletcher

• **Ellsworth R. Fletcher,** manager of industrial sales for Portland General Electric, is the new president of the Professional Engineers of Oregon. The new president has been with Portland General Electric 22 years, joining PGE as an illumination engineer on graduation from Oregon State College in 1934.

there's a better way to get it done!

Centrifugally applied and mechanically trowelled



Compact, mobile machine moves through the line

Centriline Process applies smooth, continuous leak-proof lining to inside of 16" to 144" pipe lines "in place." Applicable to fresh or salt water, oil, gas or industrial waste lines. Eliminates interior corrosion and leakage. Restores full flow coefficients.

Write for full information TODAY!

Specializing in Pipe Protection Problems
• Tate and Centriline "In Place" Interior Cement Mortar Lining • "In Plant" and "Railhead" Centrifugal Spinning of Cement Mortar or Coal Tar Linings – Somastic & Exterior Coating • Pipe Wrapping • Reclamation: Removal of Old Wrapping, Straightening, Blasting, Beveling, Testing.

PIPE LININGS Inc.
2414 East 223 St. (P.O. Box 457)
Wilmington, California

For Dependable Pipe Line Service Call in the Specialists!

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

DAVEY LINE CLEARING
DIVISION OF
DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA
Russ Bldg., San Francisco, SUtter 1-3377
Story Bldg., Los Angeles, TUcker 1929

DAVEY
ORIGINATORS OF TREE SURGERY

Deaths

• **William L. Zima,** 41, vice-president and manager of Zimco Electric Supply Co., Arcadia, Calif., died in mid-October. He was one of the co-founders of the company in 1945 with his father, Ludwig A. Zima.

• **David M. Moncrief Jr.,** 46, assistant commercial manager of Hawaiian Electric Co., died Oct. 24 after a brief illness. He was a well known and popular member of the Pacific Coast Electrical Assn., and an outstanding civic leader in Honolulu, his birthplace. He was an officer or trustee of many charitable, fraternal and educational organizations. He is survived by his wife, Gertrude, and four sons.

• **Dr. Fred Vincent,** 98, Oregon physician, utility pioneer and former Pendleton district manager for Pacific Power & Light, died recently at Pendleton. Dr. Vincent had a lifetime record of public service as citizen and humanitarian. He had lived in Pendleton since 1882.

• **August J. Pahl,** president and founder of KPF Electric Co., Stockton, died in a San Francisco hospital Nov. 14 after a long illness. His sons, Emil and John, are succeeding the electrical industry pioneer in the manufacturing business.

• **Arthur E. Bond,** 61, chief planning engineer for Pacific Power & Light since 1951, died Oct. 16 in Portland. He had been under treatment for a heart ailment. Mr. Bond joined PP&L following his graduation from Washington State College in 1922. Between 1928 and 1931 he lived in Brazil as consultant for a Brazilian utility, but rejoined PP&L in 1933.

• **Robert W. Clark,** 86, of Seattle, retired Puget Sound Power & Light official, died at his home in Seattle. Mr. Clark went to Seattle in 1913. He was a member of the Northwest Electric Light Assn., the Electric Club of Washington and Seattle Rotary Club.

• **Earle Kenney,** 73, connected with Seattle City Light since 1905, died in that city on Nov. 10. One of City Light's first employees, Mr. Kenney started as a wireman helper. In 1926 he became supervisor of the meter division, a post he held until his retirement in 1951. He was a member of City Light Employees Assn.

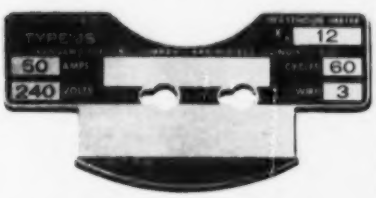
• **J. Earl Peterson,** 66, Arizona Public Service director, died Oct. 8 in New York while returning to Arizona from a European trip.

Sangamo Class 200 Meters

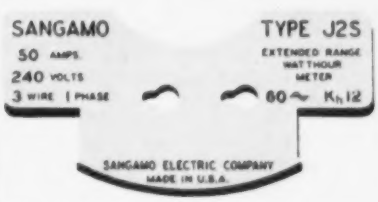
PROVED by 17 years of performance

With singlephase residential loads growing . . . with more and more 200 ampere service entrance equipment being installed every day, attention is being drawn to Class 200 Singlephase Meters. Yet the development of 200 ampere meters is nothing new. Sangamo singlephase meters with accurate 200 ampere capacity have been in use for 17 years!

THE NAMEPLATES TELL THE STORY...



IN 1940, Sangamo introduced the Type J Meter which pioneered modern singlephase meter design. The 50 amp J Meter gave excellent curves up to loads of 200 amperes. These meters have been on power company lines for 17 years.



IN 1955, Sangamo presented the J2 Meter—the first standard extended range meter in the industry. The 50 amp J2 Meter offered straight line accuracy up to 200 amperes with only 18 starting watts. These 200 ampere capacity meters are on your lines today.

NOW Sangamo offers its Class 200, 30 ampere J2S Meter at the same price as Class 100 Meters—with proven accuracy to 200 amperes, slow disk speed, high starting torque, low starting watts. Choose this *proven* Class 200 Meter to protect your investment in metering.

NOW...THEY'RE GUARANTEED FOR LIFE!

The electrical and mechanical stability of Sangamo Watthour Meters is so great that an unprecedented lifetime guarantee covering materials, workmanship and bearing systems—is offered on all new singlephase and polyphase meters using Sangamo's ball and jewel bearing system.

LIVE BETTER ELECTRICALLY

SANGAMO

ELECTRIC COMPANY *Springfield, Illinois*

JM57-10

NOTES ON THE TRADE

• **RT&E** Corp., Waukesha, Wis., has started construction on a new plant near Portland, Ore., to provide improved service for power companies in the 11 Western states. General manager of the new plant will be **C. W. Shaw,** a vice-president of the company. The new building is expected to be completed next May, and will employ 125 persons when in full operation.

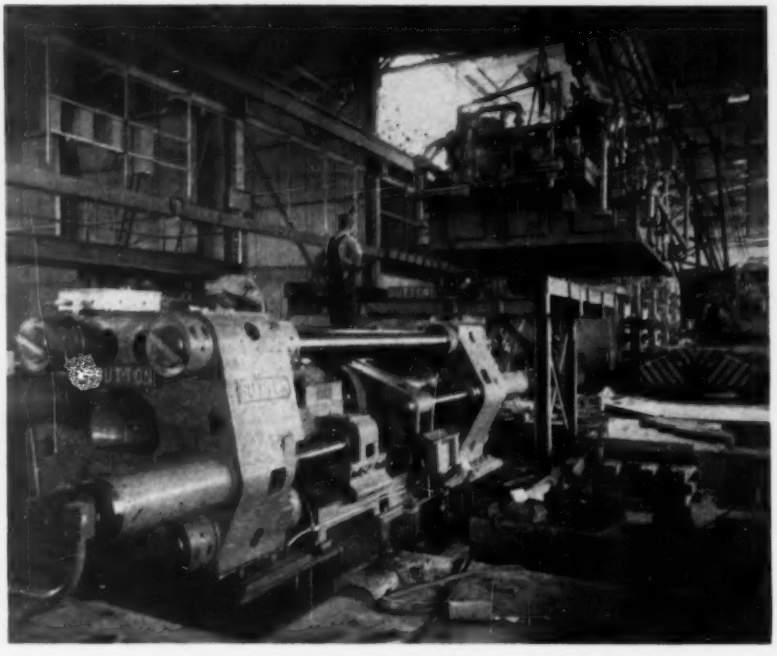
• **W. E. Iseli** has been appointed manager in Eugene, Ore., for Graybar Electric Co. The office is in Graybar's Seattle territory. Iseli has been with the company since 1946.

• **Kaiser Aluminum & Chemical** Corp. announces that **Clarence W. Higbee** has been made assistant general manager of the company's new electrical conductor division. **Gillette N. Houck** is named sales manager. Higbee came to Kaiser when the company purchased the wire and cable business of U. S. Rubber Co.

Epperson

• **John C. Epperson,** formerly president of J. C. Epperson Co., manufacturers' representative, has joined Peerless Electric Co., San Francisco, as national sales manager. Peerless also announces that Charles Krinard has been promoted to sales and service coordinator. Epperson is vice-chairman of the Golden Gate Section, IES.

Big Squeeze in New Brass Plant



Brass extrusions for varied industrial uses, including electrical components, in the 11 Western states are being turned out by this 278,000-lb extrusion press at the new plant of Titan Metal Mfg. Co. in Newark, Calif. The plant began operating late in October and is expected to reach full production in mid-December

• **Graybar Electric Co.** held open house Nov. 15 and 16 at its new office and warehouse at 15520 Cabrito Rd., Van Nuys, Calif.

• **General Electric Co.** is going to move its Oakland industry control manufacturing plant to San Leandro. The new home, under construction now, will be a 30,000-sq-ft, one-story building designed for future expansion.

• **Appleton Electric Co.** is constructing an office and warehouse at 6450 E. Bandini Blvd., near the cities of Maywood and Downey in the Los Angeles area. **William A. Mundy** will head up the operation.

• **Halo Lighting Products** Co. announces the opening of a factory sales office and warehouse at 242 S. Anderson St., Los Angeles. Hank Labord has been appointed district sales manager for southern California.

• **Rome Cable Corp.** announces two Western appointments. **D. Blake Duffy** will work from the Seattle office and **David S. Smith** from the San Francisco office.

Miller

• **John N. Daniel** is the new Northwest regional manager of Square D Co., succeeding **Daniel H. Miller** who was promoted to the position of Western division manager with headquarters at Los Angeles. Miller served in the Northwest for five years.

Joseph P. Martien, vice president, and Harry E. Dodds (seated) of Martien Electric Co. check specifications for a new job. One of Cleveland's oldest and best-known electrical contractors, Martien Electric Co. celebrated its 50th anniversary June 8, 1956.

"There's a helpful difference in Day-Brite service"

"In renovating an older building recently, we needed a variety of lighting fixtures. Day-Brite supplied them all . . . on time and properly labeled . . . made our job coordination easy.

"The Day-Brite representative worked with our foreman, going over fixtures, identifying each type, saving us unwrapping and installation time.

"The final Day-Brite touch that made our job profitable was the ease of assembly and installation. Our electricians commented on how few miscellaneous parts were needed to install the fixtures.

"This is the kind of job that has made us partial to Day-Brite equipment and service for many years."

What about you? Isn't it time you let high-quality Day-Brite fixtures bring you consistently higher profits and better-satisfied customers?

71197

Certified Lighting for a Better America

DECIDEDLY BETTER DAY-BRITE Lighting Fixtures

Day-Brite Lighting, Inc., of Calif.
530 Martin Ave., Santa Clara, Calif.

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

EARL S. Condon COMPANY
Engineering Representatives

- Burndy Corporation
- Kaiser Aluminum & Chemical Sales, Inc. (Insulated Electrical Wire Products)
- Hughes Aircraft Co. (Products Division)
- United States Rubber Co. (Uskon Division)
- Lapp Insulator Co., Inc.
- Arizona Gear & Mfg Co.
- Carma Mfg. Co.
- Preformed Line Products Co.
- P-W Industries, Inc.
- Standard Elec'l. Products Co.
- Southern Car Mfg. Co., Inc.

3450 Wilshire Blvd. • Los Angeles 5, Calif.
Phone: DU 1-3951 • TWX: LA-795

"But you can't buy that kind of a motor..."

F-148

How many times have you heard somebody that ought to know better say something like that about motors, pumps, compressors or what-have-you? And how many times you heard somebody else say, "Oh yes you can! I saw just what we need in Blank Company's ad yesterday."
Advertising pages in this magazine are packed with *news* about your business. They contain information about products and services designed to help *you* do your job quicker, better and cheaper.
To be well-informed about the latest developments in *your* business, *your* industry . . . and to stay well-informed . . . *read all the ads too.*

McGRAW-HILL PUBLICATIONS

Pascoe

• **Robert J. Pascoe** has been appointed manager of the Westinghouse Electric Corp. apparatus sales office at Emeryville. He succeeds **Stephen N. Donahoe** who was transferred to district headquarters in San Francisco in an executive capacity.

• **G. W. Conover** has been named product promotion specialist for the Cannon Electric Co., Los Angeles.

• **Harold G. Cutright** is new general sales manager of Omark Industries, Portland, manufacturer of powder actuated fastening tools.

• **J. M. Tuttle** has been appointed vice-president and general sales manager of Heil Equipment Co. of northern California. Tuttle is a member of the Pacific Coast Electrical Assn. and director of the San Francisco Better Business Bureau. He was formerly Western sales manager of Motorola Corp.

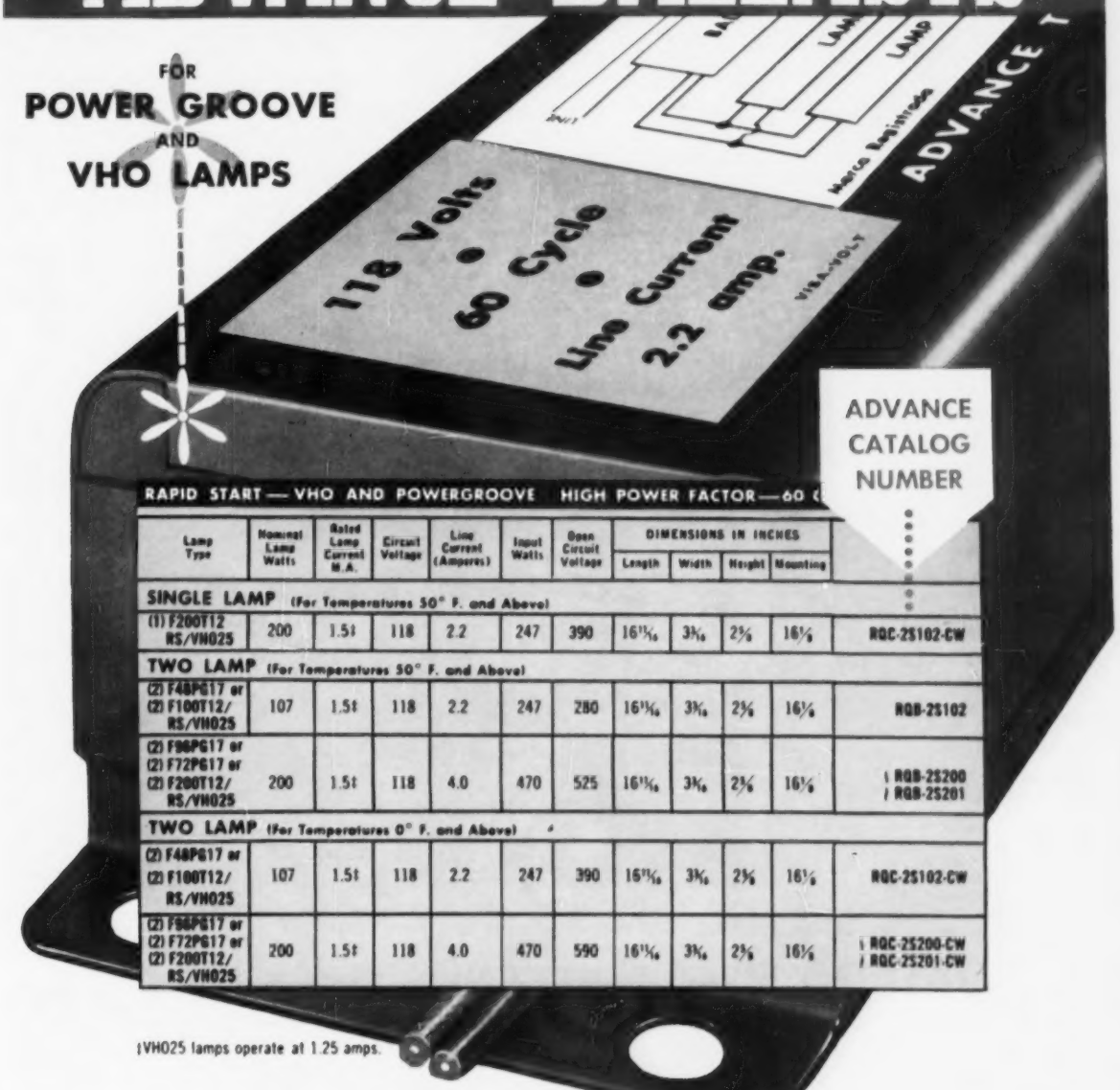
• **Thor Power Tool** Co. announces the appointment of **Alfred Escoffier** as manager of the Seattle branch.

• **Ruby Lighting** Corp. has made a major expansion move into the Ekco Products Co. plant at Whittier, Calif. Ekco is the parent company. More than 150,000 sq ft of the factory have been assigned to Ruby fixture manufacturing. Features include a six-stage bonderizing system and double electrostatic paint spraying equipment.

• **John D. Swift & Associates** is the name of a new consulting engineering firm at Olympia, Wash. John Swift was formerly head distribution engineer with Puget Sound Power & Light's southern division at Olympia. He is a registered civil and electrical engineer, and offers services in design of electrical distribution, sewer and water systems.

ADVANCE BALLASTS

FOR
POWER GROOVE
AND
VHO LAMPS



RAPID START — VHO AND POWERGROOVE HIGH POWER FACTOR—60 C

Lamp Type	Nominal Lamp Watts	Rated Lamp Current M.A.	Circuit Voltage	Line Current (Amperes)	Input Watts	Open Circuit Voltage	DIMENSIONS IN INCHES Length	Width	Height	Mounting	
SINGLE LAMP (For Temperatures 50° F. and Above)											
(1) F200T12 RS/VHO25	200	1.5‡	118	2.2	247	390	16 13/16	3 1/16	2 5/8	16 1/8	RQC-2S102-CW
TWO LAMP (For Temperatures 50° F. and Above)											
(2) F48PG17 or (2) F100T12/ RS/VHO25	107	1.5‡	118	2.2	247	280	16 13/16	3 1/16	2 5/8	16 1/8	RQB-2S102
(2) F96PG17 or (2) F72PG17 or (2) F200T12/ RS/VHO25	200	1.5‡	118	4.0	470	525	16 13/16	3 1/16	2 5/8	16 1/8	RQB-2S200 / RQB-2S201
TWO LAMP (For Temperatures 0° F. and Above)											
(2) F48PG17 or (2) F100T12/ RS/VHO25	107	1.5‡	118	2.2	247	390	16 13/16	3 1/16	2 5/8	16 1/8	RQC-2S102-CW
(2) F96PG17 or (2) F72PG17 or (2) F200T12/ RS/VHO25	200	1.5‡	118	4.0	470	590	16 13/16	3 1/16	2 5/8	16 1/8	RQC-2S200-CW / RQC-2S201-CW

‡VHO25 lamps operate at 1.25 amps.

ADVANCE now offers a complete new line of ballasts for utilizing the maximum light output of VHO and Power-Groove fluorescent lamps. These ballasts have been specifically designed to give cooler, quieter and more efficient operation of these new lamps.

ADVANCE VHO and Power-Groove ballasts are the result of continuous research by our Product Engineering Department to design compact ballasts for lighting fixtures and still maintain the high quality you expect of ADVANCE ballasts. Send for details.

The Heart of the Lighting Industry

ADVANCE
CBM CERTIFIED
World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.
2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

INDEX TO ADVERTISERS
December 1957

Accurate Mfg. Co. 146
Advance Transformer Co. 155
Allen-Bradley Co. 17, 18
Allis-Chalmers Mfg. Co. 29, 71
Aluminum Co. of America 22, 23
American Steel & Wire Div. 40, 41
Anaconda Wire & Cable 52
Anderson Electric Corp. 24
Appleton Electric Co. 54

Baldwin-Lima-Hamilton 132
Benjamin Electric Mfg. Co. 147

Carol Cable Co., Div. Crescent Co. Inc. 11
Condon Co., Earl S. 154

Davey Tree Surgery 150
Day-Brite Lighting, Inc. 153
Delta Star Electric Div., H. K. Porter Co. Inc. 39, 136
Driver-Harris Co. 59

Fanner Mfg. Co. 21
Fisher-Pierce Co. Inc. 148

Gate City Steel 146
Gedney Electric Co. 34
General Cable Corp. 49
General Electric Co.: Cleveland, Lamp Div. 128
Schenectady, Apparatus Div. 4, 5, 42, 43, 55, 56, 57, 58, 74
Graybar Electric Co. 48

Hill Transformer Co. 20
Honn Co., George E. 30
Hubbard & Co. 53
Hubbell, Inc., Harvey 13

Indiana Steel & Wire Co. Inc. 30

Johns-Manville 157

KPF Electric Co. 63
Kaiser Aluminum & Chemical Corp. 140, 141
Kearney Corp., James R. 44
Kerite Co. 15
Kuhlman Electric Co. 27

Line Material Industries 3

McGraw-Hill Book Co. 154
Meter Devices Co. 33

Pacific Coast Electrical Assn. 4th Cover
Pacific Gas and Electric Co. 3rd Cover
Paranite Wire & Cable Div., Essex Wire Corp. 68
Pennsylvania Transformer Co. 66, 67
Pipe Linings, Inc. 150
Porcelain Products, Inc. 12
Preformed Line Products Co. 139
Prodelin, Inc. 14

Roebling's Sons Co., John A. 64, 65
Rome Cable Corp. 7, 8, 9

Sangamo Electric Co. 151
Simplex Wire & Cable Co. 45
Smith Co., S. Morgan 62
Smoot-Holman 1
Soapstone Duct Co. 143
Southern California Edison Co. 2nd Cover
Southern States Equipment Corp. 69
Spang-Chalfant Div., National Supply Co. 129
Square D Co. 135
Standard Oil Co. 32
Subox, Inc. 31

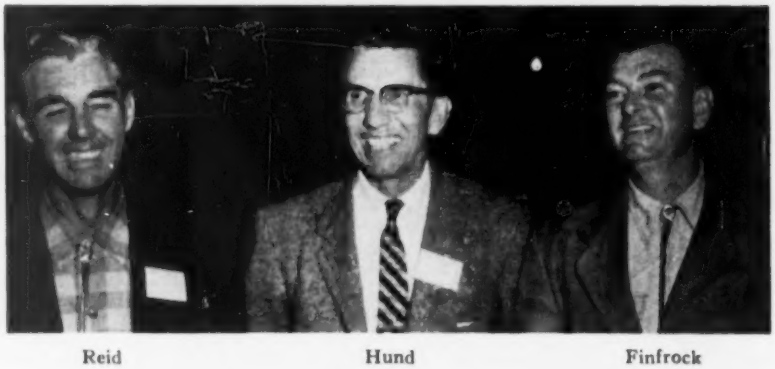
U.S. Steel Corp. 40, 41

Wagner Electric Corp. 130, 131
Westinghouse Electric Corp. 46, 47, 60, 61, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 144, 145, 158

Youngstown Sheet & Tube Co. 127

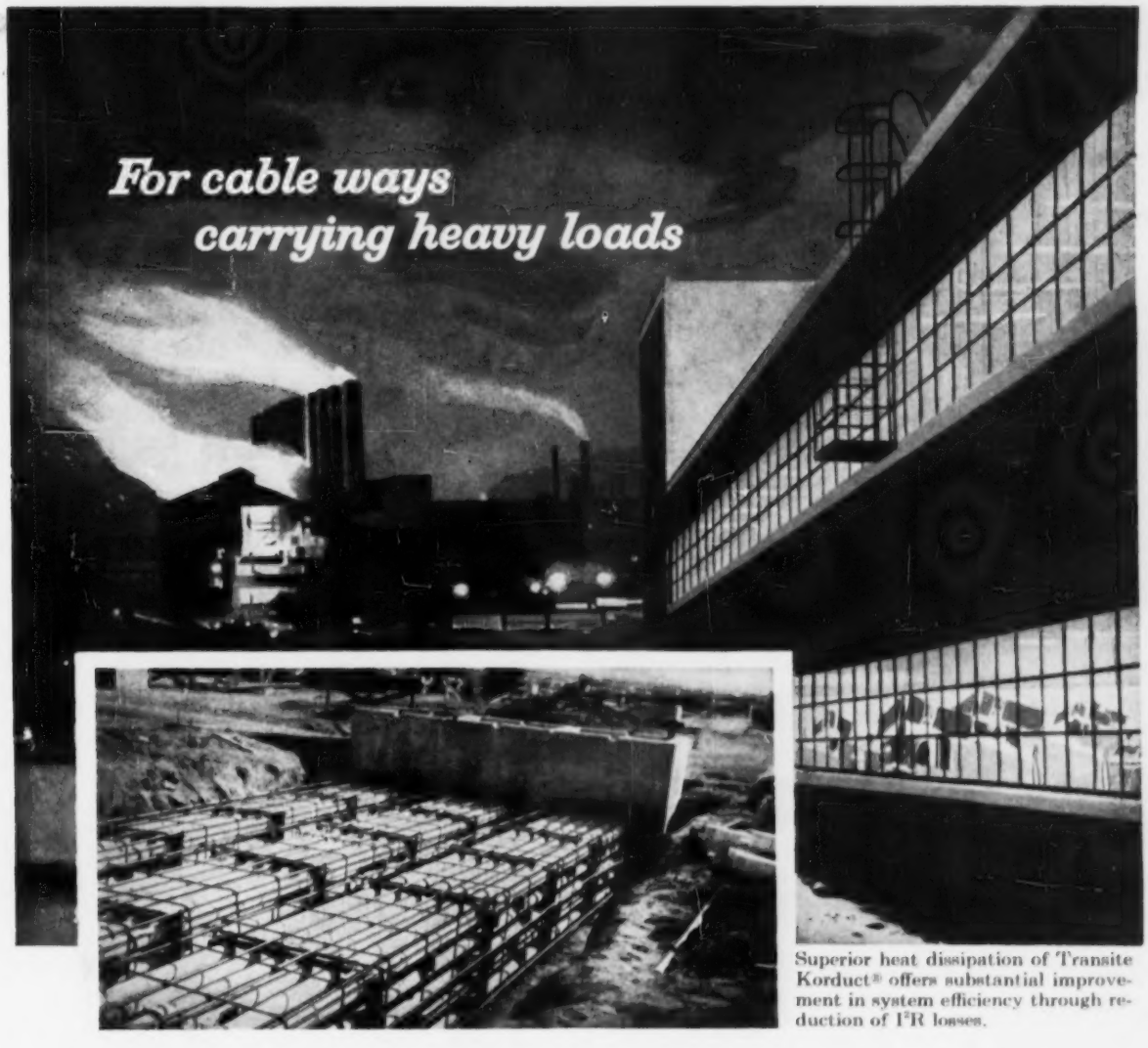
PROFILES

From far south and west and east they came to the Southwestern Section, IAE Inspectors Western roundup in Bud Brown's Barn in Scottsdale—"Chinese" Mexican bull fighter Leon Guibara of Kaiser Aluminum to master the ceremonies (right); the Orange County delegation, Wally Reid, county inspector, A. J. Hund, Anaheim inspector, and Bob Finfrock, Santa Ana inspector; well accompanied by manufacturers' men from far and near, as for instance—O. O. Stedman, Rome Cable Co., Los Angeles, Fred Ullberg Jr. of Rome's T. J. Cope Division, Collegeville, Pa., and Eustace Soares, the Pringle switch man from New York City. But these were but a sample of all who turned out and in turn were well interrmingled by the do-si-do's of the .Western dances. All shootin' arns were left home and just a good time was had by all



Reid Hund Finfrock

Stedman Ullberg Soares



Superior heat dissipation of Transite Korduct® offers substantial improvement in system efficiency through reduction of I^2R losses.

J-M Transite® Ducts mean increased capacity—longer cable life—maximum return on investment

FINDINGS OF TESTS made at Johns-Manville Research Center and approved for presentation by AIEE Insulated Conductor Committee, show that J-M Transite Ducts dissipate heat of cables faster. The result is cooler cables under a given load . . . lower I^2R losses . . . longer insulation life from lower operating temperatures.

Transite Ducts offer many other advantages, too. Made of asbestos-cement, they are incombustible, resistant to corrosion, unaffected by electrolysis. Transite Ducts resist damage when arcing occurs. These durable, lightweight ducts provide complete and permanent cable protection, together with savings on installation and maintenance.

For complete details of tests and the many advantages of Transite Ducts, write for Brochure EL-29A, and J-M Cooler Cables story. Johns-Manville, Box 14, N. Y. 16, N. Y. In Canada: Port Credit, Ont.

Johns-Manville TRANSITE Asbestos-Cement DUCTS

J-M CONDUIT for direct buried banks and exposed runs—J-M KORDUCT® for concrete banks

FULL MEASURE FOR YOUR METER DOLLAR

Westinghouse class 200 "Lifetime" meter... another Westinghouse first

Present meters are doing a creditable job . . . but the load is getting too great. Surveys show that meters installed today will be outmoded in 15 years. Westinghouse, in an effort to offer you "Full Measure" for your meter dollar, developed the class 200 "Lifetime" meter which is capable of carrying any single-phase load in the foreseeable future.

"Full Measure" takes on its greatest significance when you consider: 1.) Class 200 "Lifetime" meters have been available for over a year at the *same price* you have been paying for Class 100 meters; 2.) they are guaranteed for a full *30 years*; 3.) where lightning is prevalent, the savings are *even greater* because the "Lifetime" meter has its own arrester which expels the arc outside the meter, where it can do no damage to meter or customer property.

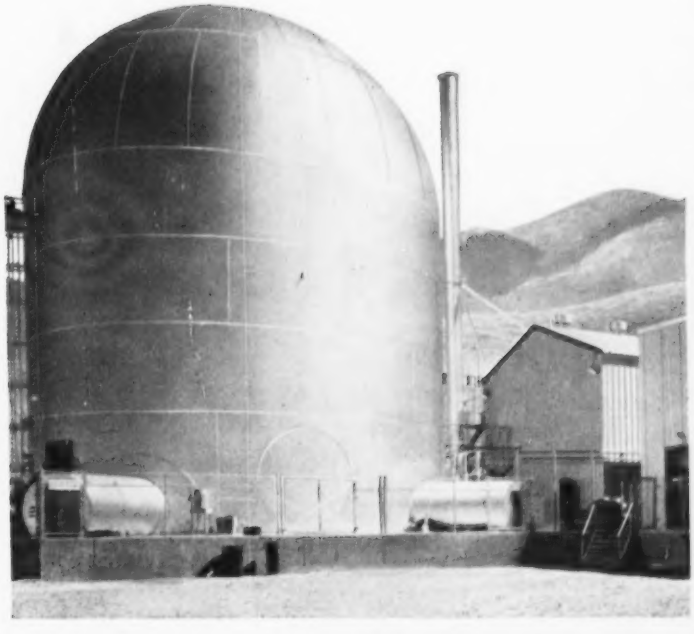
We invite you to inquire further about getting the "Full Measure" for your meter dollar. Contact your local Westinghouse Sales Representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40501

YOU CAN BE SURE...IF IT'S

Westinghouse

Nuclear power now
helps serve Northern California

P. G. and E. customers first with privately-financed atomic electricity



P. G. AND E. CUSTOMERS are the world's first users of atomic electricity produced commercially in a privately-financed plant — the new Vallecitos Atomic Power Plant near Pleasanton.

This history-making achievement in the peaceful use of atomic energy is a joint developmental project of the General Electric Company and P. G. and E. The plant's output of *A*-electricity flows into P. G. and E.'s transmission network which serves Northern and Central California. It is helping to light your home and run your appliances right now.

Atomic electricity no different

A-electricity is just the same as other electricity. The only difference is that nuclear fuel is used instead of the usual fossil fuels (oil, gas and coal) to make the steam which turns the generators.

A-electricity now costs more in the United States than power made in conventional plants. It will not become a basic power supply here until it costs no more than electricity made with fossil fuels or falling water.

The future of commercial nuclear power

G-E and P. G. and E. joined forces at Vallecitos to gain experience and know-how from building an atomic plant and operating it for everyday commercial service. The lessons being learned and the experiments being conducted at Vallecitos are hastening the day when *A*-plants will become economical. We will be ready with low-cost *A*-electricity long before the inevitable depletion of the fossil fuel supply.

Thus, P. G. and E. customers may continue to be assured of power ahead of their needs as well as the best possible service at the lowest possible cost.

Pacific Gas and Electric Company

Faex

"Dragnet's" Jack Webb to the contrary, no self-respecting member of the electric industry would knowingly "ask for the 'faex,' ma'am," if he knew it stood for sediment or dregs.

Yet when presented with the electric industry's successful "Live Better . . . Electrically" and "Full HOUSEPOWER" campaigns, an apathetic few have settled for faex rather than facts!

By now, most Americans are aware of these two dynamic promotions . . . promotions that are paying off in increased markets and sales for those who took the time and trouble to tie in and merchandise them. To those who didn't have gone the faex.

Make up your mind today to take a more active part in promoting these two fine programs in your advertising and sales efforts. You'll be helping yourself, your firm and your industry.

For complete details on either campaign, as well as other PCEA activities, come in or write to either of our offices.

PACIFIC COAST ELECTRICAL ASSOCIATION

530 West Sixth Street, Los Angeles 14, California • 681 Market Street, San Francisco 5, California